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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 10 1959 SUPPLEMENT No. 2

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PRECIPITATION AND HYDROMETEOROLOGY

(A Compilation of Backlog Abstracts for 1950–1959)

Compiled by: Katherine Martinoff

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DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DNLM:	U. S. National Library of Medicine, Washington, D. C.
DSI:	Smithsonian Institution, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.

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Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, *Jahrgang* 2 (Vol. 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PRECIPITATION AND HYDROMETEOROLOGY

(A Compilation of Backlog Abstracts for 1950–59)

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INTRODUCTION

This is the second in a series of special supplementary issues to *Meteorological Abstracts and Bibliography*, each containing a number of abstracts that have accumulated as backlog because of lack of publishing space. The first issue covered the field of instruments and methods of observation, while the second issue is devoted to hydrometeorology. The material is arranged according to the Universal Decimal Classification (U.D.C.) system in the following three main categories:

551.577 **Precipitation** (Items 1–247)
551.578 **Specific Forms of Precipitation** (Items 248–340)
551.579 **Hydrology and Hydrometeorology** (Items 341–730)

Within these main categories the material is arranged by further subdivisions of the U.D.C. system and by even more detailed subject groups. A table of contents listing all the headings will be found on the back cover of this issue.

These special issues of backlog material, together with the Decennial Indexes for 1950–59 are being compiled and published with the aid of funds provided by the National Science Foundation for this specific purpose. Most of the original abstracting was done under contract of the Air Force Cambridge Research during 1949–59.

PRECIPITATION IN GENERAL (551.577)

PRECIPITATION DATA (551.577:551.506)

10M–1 551.506:551.577(51)

*Academia Sinica. Research Institute of Meteorology, **Chung kuo ch'i hou tzŭ liao—Yü liang pien.** [Climatological data—precipitation.] **1943.** 109 p. entirely tables. In Chinese. **DLC** (Orientalia, Chinese)—A fine collection of climatological data on the amount of precipitation and number of days with precipitation for 533 stations. The tables give monthly, annual, and extreme precipitation amounts and monthly and annual number of days with precipitation. *Subject Headings:* **1. Precipitation data 2. China.**—*H. Arakawa.*

10M–2 551.577:551.501.45(439.1)

Berényi, Dénes, **Megjegyzések az évi csapadékmennyiségek sokéves átlagaihoz.** [Comments on long-period averages of annual precipitation amounts.] *Időjárás*, Budapest, 57(6):360–365, Nov./Dec. **1953.** 2 tables. **DLC**—Commenting on the climatological work by F. Hajósy, **Magyarország csapadékviszonyai** [Precipitation conditions in Hungary] the author discusses his own earlier contributions to two problems of precipitation data adjustment, namely the corrections made necessary by (a) wind effect and (b) neglect of precipitation amounts lower than 1 mm. He presents data on (a) the difference in precipitation amounts Debrecen (city)—Kismacs (village) as a function of wind velocity, and (b) number of days with precipitation less than 1 mm, 1–2.9 mm, 3–9.9 mm and 10+ mm, and amounts in each category (in absolute figures and in percentage values) at 21 stations in eastern Hungary, period 1901–1910. *Subject Headings:* **1. Precipitation data analysis 2. Hungary.**—*G.T.*

10M–3 551.506:551.577(84) 551.577.3:551.590.21:523.74(84)

*Escobar Vallejo, Ismael, **Consideraciones sobre las lluvias de La Paz.** [Notes on the rains of La Paz], La Paz, Bolivia, Servicio Meteorológico, **1946.** unpaged. tables, graphs, 26 refs. **DWB**—Factors which influence rainfall in La Paz and the variations, periodicities in dry and wet seasons, correlation between level of Lake Titicaca or precipitation and sunspots, forecasting rainfall, etc. are discussed and extensive tables of preipcitation based on a record for 1891–1945 and graphs of all

kinds illustrating the seasonal five year, ten year, average year, by year monthly and annual a smoothed or running averages are presented. The graph showing relation between sunspots a levels of lake Titicaca indicates that during years of low sunspot activity (1923 and 1934) the lev of Lake Titicaca was high and (1917–1923) vice versa. Precipitation is said to be directly p portional to solar constant. A graphical comparison is made between annual amounts (1917–3 at La Paz, Sucre and Santa Cruz. *Subject Headings:* **1. Precipitation variations 2. Precipitati data 3. Sunspot effects 4. Water level variations 5. La Paz, Bolivia 6. Lake Titicaca, Bolivi** —*M.R.*

10M–4 551.577(4

*Gabba, Luigi and Bottino-Barzizza, G., **Sui valori medi delle precipitazioni atmosferiche Milano.** [Mean values of precipitation at Milan.] *Milan. Osservatorio Astronomico di Brer Pubblicazioni*, No. 60, **1923.** 21 p. 7 tables. **DLC**—Extensive tables of monthly and annu data for Milan from 1764–1920, days with precipitation and with snow, 1805–1920, and depth snow 1881–1920, fully annotated normals are worked out and discussed. *Subject Headings:* **1. Pr cipitation data 2. Long period records 3. Milan, Italy.**—*M.R.*

10M–5 551.506:551.577(66

*Ghana. Meteorological Dept., **Summary of rainfall observations in the Gold Coast and Tog land under United Kingdom Trusteeship for the period 1939–1953, Pt. 1, The area between 6° an 7°N.** Its *Note*, No. 4, pub. Accra, **1956.** 159 p. entirely tables. **DWB** (M955 B862s)—Data f about 30 stations for each 5-day period in each month of each year, and monthly and annual tota for the years from 1939 to 1953, are presented in tables. Totals, greatest amounts during mont number of days with .01, .04, .40, 1.00 and 2.00 in. of rain or more, and number of consecutiv rainless days in longest dry period of month are given in each table. *Subject Headings:* **1. Rainfa data 2. Gold Coast 3. Togoland.**—*M.R.*

10M–6 551.506:551.577(436) 551.577.51(436

Hoinkes, H., **Neue Niederschlagszahlen aus den zentralen Ötztaler Alpen.** [New precipitatio figures for the Central Ötztaler Alps.] *Sonnblick-Verein, Vienna, Jahresbericht*, 49/50:19–27, 1951 1952, pub. **1954.** 2 figs., 3 tables, 20 refs. **DLC**—Annual average precipitation data obtained wit rain gages in high mountain locations (Central Ötztaler Alps) are presented for the periods 1926–193 and 1948–1953, and their dependence on height is discussed. Precipitation values are also show separately for summer and winter. A comparison of measured winter precipitation with snow cove suggests that the amounts measured by the precipitation gages are consistently too small in winter *Subject Headings:* **1. Precipitation data 2. Altitude effects on precipitation 3. Ötztaler Alps Austria.**—*G.T.*

10M–7 551.506:551.577(058)(45) 551.506:551.524(058)(45

*Italy, Ufficio Idrografico, Pescara, **Annali Idrologici** [Hydrologic annals], **1950.** pub. **1953** 110 p. mostly tables. **DWB**—The territory covered by this report extends over 1100 sq km on th eastern watershed of Central Italy, with some 160 km Adriatic coastline, and comprising the catch ments of the rivers between and including Salinello and Fortore. Half of the report consists o meteorological data, viz. temperature data from 49 stations (daily values, means and extremes) an rainfall data from 168 stations (daily precipitation amounts, monthly and annual totals, number o rainy days, precipitation intensities, duration, snowfall). The rest of the data are results of rive stage measurements. *Subject Headings:* **1. Precipitation data 2. Temperature data 3. Meteoro logical summaries 4. Central Italy.**—*G.T.*

10M–8 551.506:551.577(058)(45) 551.506.1:551.524(058)(45

*Italy. Ufficio Idrografico del Po, Parma, **Annali Idrologici**, [Hydrologic annals], **1950.** pub Rome, **1952.** 271 p. almost entirely tables. **DWB**—Contains extensive tables of precipitatio data for 60 stations in the Po Valley and vicinity. Data include daily precipitation, monthly total and number of days (for much larger number of stations), seasonal and annual precipitation; maxi mum intensity, snow cover, runoff, daily and monthly maximum, minimum and mean temperature and other hydrologic data. *Subject Headings:* **1. Precipitation data 2. Temperature data 3. Annua meteorological summaries 4. Northern Italy.**—*M.R.*

10M–9 551.577(74

Kingsbury, Francis H., **Progress report of the Committee on Rainfall and Yield of Drainag Areas (of New England Water Works Association).** *New England Water Works Association Journal*, 67(4):307, Dec. **1953. DWB, DLC**—Brief report indicates that station and drainag basin records for New England have been published in the *New England Water Works Journal* a follows: Pt. I, Rainfall in Mass., Vol. 56, No. 4 (1942); Pt. II, Rainfall in Maine, Vol. 57, No.

1943); Pt. III, Rainfall in Rhode Island, Conn. and eastern New York, Vol. 57, No. 3 (1943). These papers present data through 1941. Data for 1942–1950, inclusive, are ready for printing in the near future in this journal. *Subject Headings:* **1. Precipitation data 2. New England.**—*M.R.*

10M–10 551.577:085

†**Liste der aus Tempelhof nach Bad Kissingen überführten Tagebücher von Niederschlagsmessstellen.** [List of daily records of rain gage stations taken from Tempelhof to Bad Kissingen.] [c1949.?] 10 p. Mimeo. **DWB** (M:016 L773tn)—Catalog of >300 precipitation stations and years of record which were taken to Bad Kissingen after World War II. *Subject Headings:* **1. Precipitation data catalogs 2. Germany. I. Germany. Reichsamt für Wetterdienst. Bibliothek II. Germany. Deutscher Wetterdienst in der US-Zone.**—*M.R.*

10M–11 551.506:551.577(43)

*Lohr, Alfred, **Die Niederschlagsverhältnisse in Bayern im Durchschnitt der Jahresreihe 1901/1945.** [Average precipitation conditions in Bavaria during 1901/1945.] (In: Bavaria. Landesstelle für Gewässerkunde, **Beiträge zur Gewässerkunde.** Munich, **1950.** p. 16–33. fig., tables.) **DLC**—Contains mean annual precipitation data for 543 precipitation stations, as well as station location, elevation, etc. Mean monthly variations for 24 stations are also tabulated and discussed. Distribution with height, aspect of slope and region varies with wind or air flow, and season. *Subject Headings:* **1. Precipitation variations 2. Precipitation data 3. Bavaria, Germany.**—*M.R.*

10M–12 551.506:551.577(485) 551.577:551.582(485)

Melin, Ragnar, **Vattenhaushållningen på Gotland: några synpunkter.** [Water economy at Gotland: some view points.] *Grundförbättring*, Uppsala, 4(3):139–145, **1950/1951.** graphs, table. **DLC**—Mean precipitation and runoff about 1930 was 350 mm in the greater part of Svea and Gotland. Precipitation and temperature variation in Visby is presented graphically for different periods between 1901–1950. During 1860–1910 precipitation was 491 mm; from 1901–1930, 513 mm and in the dry 10-year period 1918–1927, 478 mm. The period from 1937–1944 gave 65 mm, or $\frac{2}{3}$ of the normal spring precipitation. Investigations of the possible influence of change in temperature, wind speed and time of insolation indicate that precipitation changes are not responsible for the dried-out soil, and evaporation shows no significant increase because of increased air temperature. Continuous observations show that temperature increased after 1930, cloud cover increased slightly and, in general, wind force remained unchanged. *Subject Headings:* **1. Precipitation 2. Climatic influences 3. Gotland.**—*W.N.*

10M–13 551.506:551.577(497.1)

*Milosavljević, Katarina, **Intenzitet pljuskova u Beogradu, Vrnjačkoj Benji i Prilepu.** [Rainfall intensity at Belgrade, Vrnjacha, Banja and Prilep.] *Srpska Akademija Nauka, Belgrade, Posebna Izdanja*, v. 194, **1952.** 44 p. 8 figs., 20 tables, 8 refs. In Serbian; French summary p. 42–44. (*Khidrotekhnicki Institut, [Publication]* No. 1.) **DWB**—Statistical study on rainfall intensity versus rainfall duration based on pluviograph data using 22 years of observations for Belgrade and 14 years for the other two stations. *Subject Headings:* **1. Precipitation data 2. Rainfall intensities 3. Belgrade, Yugoslavia.**—*A.A.*

10M–14 551.577:551.578.46(437)

***Ovzdušné srážky naúzemí Československé Republiky v odtokovem roce . . . , Atmosphäriche Niederschläge. . . .** [Precipitation in the Czechoslovak Republic for the water year. . . .] Prague, ——. Issues seen include Vol. 128(37) for 1935, pub. **1939**; Vol. 131, pub. **1940**; Vol. 135, pub. **1941.** This is *Vodopis Československé Republiky, Prague, Ser. 2.* Title of general series varies: *Vodopis Čech a Moravy.* **DLC** (GB726.C9V62)—Results of measurements of rainfall in the water year 1935 (Dec. 1, 1934–Nov. 30, 1935) and snowfall and thickness of snow cover in the winter period (Sept. 1934–May 1935). The publication contains the following tables: 1) List of stations in alphabetical order; 2) List of stations in order of river basins (2273 stations); 3) Monthly and yearly amount, date and highest precipitation, number of days with precipitation ≧0.1 and 1 mm and annual normal; 3a) Relative values of precipitation, in percent of normal; 4) Precipitation data, monthly and yearly in m, 3^3, mm and 1/s, km^2; 5) Snowfall amount, number of days with snowfall and snow cover, thickness of snow cover and 6) Water equivalent of the snow cover. *Subject Headings:* **1. Precipitation data 2. Snowfall amount 3. Snow cover 4. Czechslovakia. I. Czechoslovakia. Státní Ústav Hydrologický a Hydrotechnický.**—*A.M.P.*

10M–15 551.506:551.577(438)

*Poland. Państwowy Instytut Hydrologiczno-Meteorologiczny, **Opady średnie w dorzeczu Wisły w latach 1920–1937.** [Average amount of precipitation in the Vistula Basin during the years

1920–1937.] Its *Prace*, Vol. 17, **1951.** 26 p. 16 tables, map. **DLC**—Contains 16 tables showi average monthly, semi-annual and annual amounts of precipitation for the years 1920–1937. A m of the Vistula Basin and a list of the 16 water gage stations with indications of their surface are in square km. are included. The method used in computing precipitation amounts is describe *Subject Headings:* **1. Precipitation data 2. Vistula Basin, Poland.**—*A.M.P.*

10M–16 551.506:551.577(43

*Poland. Państwowy Instytut Hydrologiczno-Meteorologiczny, **Opady średnie w zlewniac ważniejszych dopływów Wisły, Bugu i Narwi w latach 1920–1937.** [Average amount of precipitati at the confluence of the main tributaries of the Vistula, Bug and Narew Rivers during 1920–193 Its *Prace*, Vol. 23, **1951.** 36 p. 39 tables, map. **DLC**—Tables show average monthly, sem annual and annual amounts of precipitation in the basins of the most important tributaries of t Vistula River. *Subject Headings:* **1. Precipitation data 2. Poland.**—*A.M.P.*

10M–17 551.506:551.577(43

*Poland. Państwowy Instytut Hydrologiczno-Meteorologiczny, **Opady zmierzone w dorzecz Wisły w'latach 1920–1939.** [Precipitation measurements in the Vistula Basin during 1920–193 Its *Prace*, Vol. 9, **1951.** 298 p. mostly tables, map. **DLC**—Tables show amount of monthl summer, and yearly precipitation measured at 1088 stations in the Vistula River basin from 192 1939. Two lists of stations (one in alphabetical order, the other in geographical order), as well a map of the territory are included. The tables were compiled on the basis of observational da published in the yearbooks of the State Meteorological Institute, the yearbooks of the State H drographic Service, and the Deutsche Meteorologische Jahrbücher from 1920 to 1939. *Subje Headings:* **1. Precipitation data 2. Vistula Basin, Poland.**—*A.M.P.*

10M–18 551.506:551.577:551.311.2:631.4(54

Quadir, M. A. (*Pakistan*), **Effect of precipitation on soil erosion in Sind and Baluchistan.** (I UNESCO, **Symposium on Soil Erosion and its control in the arid and semi-arid zones, Karach Pakistan, Nov. 1957.** Issued as [*Publication*] UNESCO/NS/AZ/KAR/21. 14 p. 5 graph 2 tables, 6 maps, 4 refs. Photostat.) **DWB** (M:631.45 Qlef)—Detailed statistics of rainfall amoun intensity and frequencies, especially of rains of .74 per day or more, are presented for about 3 stations in Sind and Baluchistan, and the results are shown on maps and discussed. The seasona variations are brought out in both maps and tables. In the southeast portion the greatest frequenc of heavy rains is in the monsoon season; in the northwest in winter, and in the southwest in bot seasons. Autumn is the dry season. The aim of the study is to determine methods of reducing so erosion; a good grass or vegetative cover during the rainy seasons is the only solution suggestec *Subject Headings:* **1. Precipitation intensity 2. Precipitation frequencies 3. Heavy rain statistic 4. Soil erosion 5. Pakistan.**—*M.R.*

10M–19 551.506:551.577(691)(694.1) 551.577:551.515.1/

Ravet, J., **Les pluies à Madagascar et aux Comores.** [Rains in Madagascar and the Comor Islands.] *Madagascar. Service Météorologique, Publication*, No. 26, Feb. **1958.** 142 p. figs. charts, tables. **DWB**—This study on the rains in Madagascar and the Comoro Islands contain data of 62 pluviometric stations, the measurements of which spread over 25 years (1931–1955) Pluviometric data from each station are recorded in 3 tables which successively show mean an extreme monthly and annual pluviometric values, number of rain days $\geqslant$0.1, 2.5, 10, 20, 50 and 10 mm and frequency in % of monthly rains of 0–1 mm, 1.1–25 mm, 25.1–50 mm, 50.1–100 mm, 100.1 200 mm, etc. and those >500 mm. Charts show monthly and annual precipitation distribution The dry season extends from May–October and the rainy season from December–March. Th distribution of precipitation due to certain cyclones is shown, and the daily isohyetal charts during the approach and passage of these cyclones are given. In general, the following distribution i observed: when the disturbance approaches or leaves the East coast, the regions south of its trajectory receive the greatest rain quantities; on the west coast, the heaviest precipitation occurs on the north of the trajectory. *Subject Headings:* **1. Precipitation data 2. Cyclonic precipitation 3. Madagascar 4. Comoro Islands.**—*A.V.*

10M–20 551.506:551.577(624

*Sudan. Meteorological Service, **Annual rainfall parameters, 1921–1950.** Its *Pamphlet*, No. 2 Oct. **1954.** 4 p. fig. (fold.), 3 tables. **DWB**—Tables present average annual rainfall, the probabl error, upper and lower quantities and the median values for rainfall stations in the Sudan, th records of which cover 24 or more complete years; probability percent of the occurrence of deviation from the average annual rainfall exceeding the amounts specified by probable error, and a comparison of the observed frequency of deviations from the average with the computed frequencies. *Subjec*

Headings: **1. Rainfall data 2. Long period records 3. Rainfall variations 4. Sudan. I. Matthews, L. S.**—*I.L.D.*

10M–21 551.506:551.577(961.3)

*U. S. Naval Station, Tutuila, Samoa, **Rainfall reports, March 1923–June 1942** [incomplete]. monthly, 1 sheet per month. Typescript. Some later reports on letter-head of Government of American Samoa, Pago Pago, American Samoa. Entirely tables. **DWB**—Daily and monthly rainfall amount in inches and tenths for Tutuila, Samoa, after April 1, 1940, data for 2 stations at Tutuila, Samoa, (Naval Radio Station and Commissary), and for Pago Pago, Leone, Ta'u and Swain's Island and later for Leloaloa are included. Reports for Aug. 1924, Jan.–Feb.–June and Oct. 1933; July–Aug. 1934, Oct. 1936, March 1939, March–Aug. 1940, April 1941 and July–Dec. 1942 are missing. *Subject Headings:* **1. Rainfall data 2. Tutuila, Samoa.**—*M.R.*

10M–22 551.506:551.577.2(485)

*Wallén, Carl Christian (*Stockholm*), **Nederborden i Sverige: medelvärden 1901–1930.** [Precipitation in Sweden: average values for 1901–1930.] *Sweden. Meteorologiska och Hydrologiska Institut, Meddelanden, Ser. A*, No. 4, **1951.** 48 p. 9 figs., 5 tables, charts (fold.), refs. Pref. in Swedish and English; English summary p. 16–18. Price kr. 12:—. **DWB**—A descriptive, statistical and graphical analysis of variations in normal precipitation distribution over Sweden (1901–30). The beautifully colored isohyetal charts (monthly, seasonal and annual) show the extreme variability in the mountain regions compared with the more even distribution over the main part which is more level. The influence of elevation and continentality is analyzed statistically. The number of stations was 450 in 1900 and increased to about 700 by 1930, with 80% in the southern part of the country. About 200 stations had a full 30 years of record, but many show inhomogeneities. Doubtful records were eliminated and the shorter records adjusted to nearby "normal" stations, and additional adjustments made for elevation and continentality. Runoff records were used to determine rainfall in high mountain areas where records are inadequate. All "normal" and other stations are listed with complete data about location, period of record, etc. Tables give mean monthly, annual and seasonal precipitation in mm for all stations and highest and lowest precipitation for "normal" stations. Coefficients of variation of a number of stations are given for Jan., April, July, Oct. and the year. *Subject Headings:* **1. Precipitation distribution 2. Precipitation data 3. Isohyetal charts 4. Normal period 1901–30 5. Sweden.**—*M.R.*

10M–23 551.506:551.577(866)

Zimmerschied, W. (*Quito, Ecuador*), **Vorläufige Mitteilung über die Niederschlagsverhältnisse in Ekuador.** [Preliminary report of precipitation conditions in Ecuador.] *Meteorologische Rundschau*, Berlin, 11(5):156–162, Sept./Oct. **1958.** 5 figs., 6 tables. **DWB, DLC**—On the basis of the best observable precipitation data for Ecuador the author analyzes the characteristics of the precipitation regime. The contents of this paper include the following: the nature of the available data and their presentation; precipitation characteristics in the east-west axis and precipitation distribution on the coastal plain and along the coast itself. Data are presented in tables and graphs which show: annual precipitation totals of several stations; annual precipitation of stations in the east-west direction for the period 1933–1957; mean monthly totals for the same stations and years; annual precipitation totals of stations along a north-south direction; two hourly precipitation amounts at Babahoyo (mean for 1931–1939); daily and annual variation of precipitation at Quito (mean for period 1918–1957), etc. *Subject Headings:* **1. Precipitation data 2. Ecuador.**—*I.L.D.*

10M–24 551.506:551.577(497.1) 551.506.1

*Yugoslavia. Hidrometeorološka Sluzba, Belgrade, **Izvestaj o padavinama, 1948, 1949.** [Report on precipitation for 1948, 1949.] Nova Gradiska, Mirko Gembarovski, **1951.** 2 pieces, 394 and 493 p. entirely tables, maps (fold.) laid in. Table of contents in French and Croatian. (For 1950, Pt. 2, *see* 10.10–149, Oct. 1959, *Met. Abs.*) **DLC, DWB**—The 1260 stations (1949) in the precipitation network of Yugoslavia are first listed alphabetically and then by river basins, with name of observer, geographic coordinates and year of beginning of record. The major portion of this voluminous yearbook is devoted to tables of daily precipitation for each of these stations, monthly and annual totals, number of days with precipitation of various amounts and maximum daily precipitation for each month and for the year at each station. A folded map gives detailed isohyets for the year. Greatest amount in 1948 (3990 mm) occurred at Platak (1111 m elev.) on the norths west coast. At that place January was wettest month with 976 mm and March driest with 2 mm. In 1949 the max. was 3500 mm at Risan on the SW Coast and Nov. was the wettest month with >1250 mm in the same region. *Subject Headings:* **1. Precipitation networks 2. Precipitation data 3. Yearbooks 4. Yugoslavia.**—*M.R.*

PRECIPITATION EFFECTS (551.577)

10M–25 551.3.053:551.579 551.577:551.311.2:631.

Fournier, Frédéric and Hénin, Stéphane, **Nouvelle formule oroclimatique pour apprécier l dégradation spécifique des terres.** [New oroclimatic formula for determining the specific weatherin of soils.] *Académie des Sciences, Paris, Comptes Rendus,* 248(11):1694–1696, March 16, 1959 **DWB, DLC**—In the course of their study on specific weathering of soils, authors have found goo correlations between a climatic factor $C = p^2/P$ and the specific weathering of river basins. In thi formula, p represents the amount of precipitation of a river basin during the month of the year wit most precipitation, P the annual amount of precipitation of the same river basin. The orographi characteristics of the basin being expressed in the form of a coefficient $C_1 = H_2S$, where H = mean height of the relief and S = surface of the basin in km², one establishes a regression formula in which those factors are considered, and which permits computation of specific weathering for any spo of the globe. *Subject Headings:* **1. Soil weathering 2. Erosion 3. Precipitation effects 4. Climati formulas.**—*A.V.*

10M–26 551.577:551.311.2:631.4

*Kelly, L. L., **Comparison of the Colorado and the type-F artificial rainfall applicators.** U. S Soil Conservation Service, Office of Research, Hydrologic Division, Aug. **1940.** 27 p. 8 figs. 5 sheets (fold), laid in., ref. **DWB**—Monograph discusses, illustrates and tabulates data from tw types of sprinklers used to simulate rainfall for soil erosion studies. The Colorado type, developed by the Soil Conservation Service in Colorado, and the type 7 applicator, developed by the S.C.S. in the National Hydraulic Laboratory in Washington, D. C., were tested at the Central Great Palins Experimental Watershed at Hastings, Neb., to determine infiltration capacity of soil under different systems of sprinkling and different soil moisture or soil cover conditions. The type 7 applicator gives drops of 2.2 or 1.6 mm diameter and uniform rates equal to 3.5 or 1.7 in. per hour, and more nearly approaches natural rainfall conditions, though having a lower infiltration rate than the Colorado type, owing to greater erosive power of larger drops. *Subject Headings:* **1. Artificial rainfall applicators 2. Rainfall effects 3. Infiltration rates 4. Soil erosion experiments.**—*M.R.*

10M–27 551.577:551.311.2:631.4 551.3.053:551.579

Kuron, H. and Steinmetz, H. J. (*both, Giessen*), **Die Plantschwirkung von Regentropfen als ein Faktor der Bodenerosion.** [Splash effect of rain drops as one cause of soil erosion.] *International Union of Geodesy and Geophysics, Association of Scientific Hydrology, Toronto, Sept. 3–14, 1957,* [*Transactions*], Vol. 1:115–121, pub. **1958.** 4 figs., 4 refs. English summary p. 115. **DWB**—The total process of soil erosion is caused chiefly by two effects: one produced by the impact of falling raindrops and the other by washing away through flowing surface water. Laboratory experiments were conducted to determine a specific type of splash effect, i.e. the impact of a water drop on a soil surface saturated with or flooded by water, as it had been noted that one main reason for erosion is the whirling effect of drops. This can cause a strong stirring up of the flooded soil surface and the formation of a soil suspension going downhill with water flow. Special stress was laid on the depth of the effect of single falling drops and on the way in which the drops influence water flow. Tests showed that at first there is an increase of soil splash with increasing depth of water. This is true mostly for silt soils with little cohesion. At greater water depth soil splash decreases, the total amount of the soil transported, however, is increased, since the turbulence of running water caused by the impact of the drops (whirling effect) becomes more and more important. As a result of water turbulence the soil surface is changed in a way that is comparable to whirlpools. With increasing depth and velocity of water flow the whole process of erosion is gradually less affected by the falling drops. The tests made on this part of soil erosion are not yet finished and must be supported by quantitative measurements under field conditions. *Subject Headings:* **1. Raindrop splash 2. Soil erosion 3. Rainfall effects 4. Rain drop erosion.**—*Authors' abstract.*

10M–28 551.577:551.579:551.311.2:631.4

Langbein, W. B. (*U. S. Geological Survey, Wash., D. C.*) and Schumm, S. A. (*U. S. Geological Survey, Denver, Col.*), **Yield of sediment in relation to mean annual precipitation.** *American Geophysical Union, Transactions,* 39(6):1076–1084, Dec. **1958.** 8 figs., 4 tables, 20 refs., 2 eqs. **DWB, DLC**—Effective mean annual precipitation is related to sediment yield from drainage basins throughout the climatic regions of the United States. Sediment yield is a maximum at about 10 to 14 inches of precipitation, decreasing sharply on both sides of this maximum, in one case owing to a deficiency of runoff and in the other to increased density of vegetation. Data are presented illustrating the increase in bulk density of vegetation with increased annual precipitation and the relation of relative erosion to vegetative density. It is suggested that the effect of a climatic change on sediment yield depends not only upon direction of climate change, but also on the climate before the change. Sediment concentration in runoff is shown to increase with decreased annual precipitation, suggesting

further that a decrease in precipitation will cause stream channel aggradation. *Subject Headings:* **1. Precipitation effects 2. Soil erosion 3. Vegetation influences.**—*Authors' abstract.*

10M–29 551.577:551.311.2:631.4 551.3.053:551.579

Matsuoka, K. and Kawakami, M. (*Shikoku Agric. Experiment Station*), **About soil erosion at grass land, Pt. 1, About rainfall and soil erosion in spring.** *Journal of Agricultural Meteorology*, Tokyo, 9(1):4–6, Dec. **1953.** 4 figs., table. In Japanese; English summary p. 6. **DWB**—Amount of soil erosion and of water runoff during rainfall was measured by means of a concrete dam placed at the outlet of a plot of natural grass. Soil erosion was found to be considerable at an early stage of rain, then to decrease and later to increase again. A similar time relation was found to exist in the case of water runoff. The relations identified are presented graphically. *Subject Headings:* **1. Soil erosion 2. Runoff 3. Rainfall effects.**—*G.T.*

10M–30 551.577:625.7(437.1)

Myslil, Vlastimil and Šilar, Jan., **Zpráva o sesuvném území u Radotína.** [Report on the caved-in territory near Radotin.] *Meteorologické Zprávy*, Prague, 5(2):50, **1952.** table. **DLC**—A thorough geological survey was made of the area where the Radotin-Trebotov highway (Bohemia) caved in in 1940 and 1941. Monthly precipitation totals are tabulated for the winters 1935–36 to 1942–43. The damage was mainly caused by abnormal accumulation of winter precipitation. Establishment of a better drainage system and of an observation service during critical periods in the threatened area are recommended. *Subject Headings:* **1. Precipitation effects on roads 2. Bohemia, Czechoslovakia.**—*G.T.*

10M–31 551.577:551.311.2:631.4

Nishikata, T. and Iida, T. (*Hokkaido National Agric. Exp. Station*), **Dangerous precipitation and its seasonal occurrence Studies on soil erosion control, (Pt. 5).** *Journal of Agricultural Meteorology*, Tokyo, 10(3,4):101–104, March **1955.** 2 figs., 5 tables, 5 refs. In Japanese; English summary p. 104. **DWB**—The authors investigated the relation between precipitation and soil loss caused by rain on plots after potatoes and barley had been harvested (1951). The results showed that the soil loss was caused by rain of an intensity of 2 mm/10 min, increasing to 3–4 mm/10 min. The rate of minimum infiltration velocity decreased markedly when maximum rain intensity was more than 2 mm/10 min. From these results, considering the frequency and duration of precipitation, the critical intensity of dangerous precipitation is tentatively determined as 2 mm/10 min. Using observational data from 1944 to 1951 of the Kutchian Meteorological Station, seasonal occurrence of dangerous precipitation was calculated. Total precipitation, dangerous precipitation and frequency of dangerous rainfall all showed a maximum value in Sept., so it was suggested that this month is the most dangerous for soil erosion, especially in the first decade of the month. It was observed that among the dangerous precipitation, rain with a critical intensity (2.0–4.0 mm/10 min. max.) occurred most frequently, so it was suggested that soil erosion could be controlled by adequate soil management. *Subject Headings:* **1. Precipitation effects 2. Critical precipitation intensity 3. Soil erosion.**—*Authors' abstract.*

10M–32 551.577:551.524.36

Schove, D. Justin, **Past rainfall and future temperatures.** *I.U.G.G. Association of Meteorology, Brussels, 1951, Procès-Verbaux, des Séances, Mémoires et Discussions*, pub. **1953.** p. 190. ref. **DWB**—Temperature extremes occur most often after wet years. *Subject Headings:* **1. Rainfall effects 2. Long range forecasting 3. Temperature-precipitation relationships 4. Temperature extremes 5. Europe.**—*A.A.*

10M–33 551.577:551.311.2:631.4 551.3.053:551.579

Schreiber, H. (*Giessen*), **Einfluss der Bodenstruktur und des Oberflächenzustandes auf Abfluss und Abtrag.** [The influence of soil structure and surface condition on runoff and erosion.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 3–14, 1957*, [*Transactions*], Vol. 1:65–71, pub. **1958.** 5 tables. English summary p. 65. **DWB**—The influence of soil structure and surface condition on runoff and erosion could be observed in experiments on the effect of synthetic soil conditioners as stabilizing agents. Erosion measurements on small plots on a silt loam and on a very stony debris soil have shown that soil and water losses are effectively lower by the production of a waterstable aggregation and a rough soil surface. On the other hand soil loss per unit of runoff, i.e. the relative erosion density (g/Ltr), gets higher with better aggregation of the surface layer. Therefore, with increasing intensity and duration of rain the differences in soil loss from plots with good structure as compared to those with a compacted and crusted surface gradually decrease. This is greatly caused by raindrop splash. In the case of loose, but stable crumbs on the soil surface the kinetic energy of the falling raindrops is immediately transformed into soil transportation, while on compact soils energy is mostly consumed in detaching

fine soil particles. On small plots the amount of soil loss is highly influenced by the portion of splashed soil. The portion of soil lost by splash is considerable only in the upper part of a slope, while in the lower part much of the raindrop energy is consumed by resplashing the moved soil. The increasing thickness of the surface water layer downslope also can protect the soil from direct impact of raindrops. On the other hand, the transport by flowing water becomes here more important. Therefore on large sloping areas increasing quantity and energy of surface flow has a greater soil detaching effect than on small plots. It was also found, that a good structured rough surface not only suppresses the erosion of the soil as a whole but also favors the fixation of the finely grained portion, the colloidal soil fraction (clay and humus). *Subject Headings:* **1. Soil structure effects on runoff 2. Runoff—soil relationships 3. Soil erosion 4. Rainfall effects.**—*Author's abstract.*

10M–34 551.577:551.311.2:631.4

Smith, Dwight D., **Factors affecting rainfall erosion and their evaluation.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 3–14, 1957,* [*Transactions*], Vol. 1:97–107, pub. **1958.** 3 figs., 4 tables, 14 refs. **DWB**—This paper discusses the four basic factors affecting the rate of surface erosion: slope, cover, soil, rainfall, and their evaluation by use of fractional acre plots with both natural and simulated rainfall. A method of relating soil losses from these plots to farm sized fields is briefly presented. The use of punch cards in a central statistical laboratory and of multiple correlation and related statistical analyses for evaluation of factors and practices from a widely scattered group of runoff and erosion stations, is described. An example of the possibilities of this approach is recently developed regression equation which accounts for over 90 percent of the variation in individual storm soil losses from fallow plots by four parameters of rainfall energy and intensity. *Subject Headings:* **1. Rainfall effects 2. Soil erosion.**—*Author's abstract.*

10M–35 551.577:551.311.2:631.4 624.131.54:551.579

Taniguchi, Toshio, **Effects of rainfalls and ground water upon the movement of land slide.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 3–14, 1957,* (*Transactions*), Vol. 1:181–193, pub. **1958.** 13 figs., 4 tables, 3 eqs. **DWB**—Experiments conducted in Kamiya, Okimi-Village, Higashi Kubikigun, Niigata Prefecture, are described. Land sliding will be studied by means of physical analysis according to the data obtained from observations of land movement and weather conditions since Oct. 1948. *Subject Headings:* **1. Rainfall effects on landslides 2. Landslides 3. Niigata Prefecture, Japan.**—*From author's abstract.*

PRECIPITATION DISTRIBUTION (551.577.2)

10M–36 551.577.2:551.437(44)

Cappus, P. (*France*), **Répartition des précipitations sur un bassin versant de faible superficie.** [Distribution of rainfall over a small basin.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 3–14, 1957,* [*Transactions*], Vol. 1:515–528, pub. **1958.** 4 figs., 9 tables, 15 refs., 2 maps. **DWB**—Rainfall effects over the experimental basin of Alrance (France), which has an area of 3 km², were studied from 1951–1956. The distribution of precipitation in the region is uneven, because of wind. Data are given on rainfall, snow, and the effect of wind. *Subject Headings:* **1. Precipitation distribution 2. Wind effects 3. Alrance Basin, France.**—*N.N.*

10M–37 551.577.2(788)

*Colorado. State Planning Division, **Colorado precipitation map: climatological, population and economic data.** Denver, **1957.** fold. map. 22×17 in. text and tables on verso. Price: $.25. **DWB** (M77/788 C719 co)—The map shows average monthly precipitation distribution in inches. Figures under the cities and towns indicate 25-year average annual precipitation during the years 1932–1956, inclusive. Areas of much more than 30 in. of precipitation are in the western parts of the state while those with 10 to 15 in. are predominantly in the eastern part. *Subject Headings:* **1. Precipitation charts 2. Precipitation distribution 3. Colorado.**—*N.N.*

10M–38 551.577.2:551.577.51(432.2)

Dietze, Gerhard (*Kaltennordheim/Rhön*), **Über den Jahresgang der Niederschlagshöhe in Thüringen.** [Annual course of precipitation in Thuringia.] *Weimar. Thüringische Landeswetterwarte, Mitteilungen,* No. 8:5–28, **1949.** 10 figs., 12 refs. **DLC**—Peculiarities of the annual course of precipitation are characterized by percentage of annual precipitation occurring in each season (map for summer and winter). Orographic influences are studied in detail, and a local classification of the annual course is proposed (winter type with 4 subdivisions, summer rain type with 7 subdivisions, depending on location of main and secondary maximum). *Subject Headings:* **1. Precipitation distribution 2. Orographic influences 3. Thuringia, Germany.**—*A.A.*

10M–39 551.577.2:551.515.13(439.1)

Endrödi, Gabriella, **A Csapadék eloszlása Magyarországon földközi-tengeri ciklon-helyzetekben.** [Distribution of precipitation in Hungary in Mediterranean cyclonic conditions.] *Időjárás*, Budapest, 62(1):20–26, Jan./Feb. **1958** 6 figs., 2 tables, 3 refs. Hungarian and French summaries p. 20. **DLC**—On the basis of 18 years of data of 216 Hungarian stations, precipitation distribution during Mediterranean cyclonic situations are analyzed. Data are presented on 1) precipitation amount falling in V/b situations; 2) precipitation effectivity of such situations; and 3) probability of occurrence of specified amounts during the different seasons. Precipitation amount during V/b situations in winter, when they are most frequent, is 3–7 mm; and in summer, when they are least frequent, 6–22 mm. Precipitation effectivity during these seasons is 21–37% and 4–12%, respectively. *Subject Headings:* **1. Precipitation distribution 2. Cyclonic activity 3. Hungary.**—*Transl. of author's abstract.*

10M–40 551.577.2(47)

Evseev, P. K., **Raspredelenie livnevykh i oblozhnykh osadkov na territorii SSSR.** [Distribution of shower and steady precipitation over the U.S.S.R.] *Meteorologiia i Gidrologiia*, Leningrad, No. 3:13–20, March **1958.** 4 figs. (incl. maps), 2 refs. **DWB, DLC**—On the basis of 19 years (1936–1954) of 90 weather stations over the USSR the author investigated the distribution of shower and steady precipitation over the USSR and the types of annual variation of shower and steady precipitation characteristics for large physiographic regions. Along the Murmansk coast steady and shower rainfall show a parallel variation during the entire year but shower rainfall predominates during the warm season. In continental European Russia, shower precipitations are infrequent during the cold season but obtain their maximum during the summer. The cause of steady precipitation is the reverse of the shower precipitation. In Siberia steady precipitation attains its maximum in the summer. In central Asia both shower and steady rainfall obtain their maximum during the winter-spring months and both have a parallel annual variation. The areal distribution of shower and steady rainfall is discussed with the aid of maps giving isohyets of these two types of rainfall for European and Asiatic Russia. Graphs giving annual variation of steady and shower rainfall for various localities in the USSR are presented, and the circulation factors responsible for variations in the annual and areal distribution of shower and steady rainfall are discussed. *Subject Headings:* **1. Precipitation distribution 2. U.S.S.R.**—*I.L.D.*

10M–41 551.577.2(661)

French West Africa. Service Météorologique, **Cartes normales de pluie de l'Afrique occidentale. Période 1921–1950.** [Normal rainfall charts of French West Africa. Period 1921–1950.] Paris, *Direction de la Météorologie Nationale*, Nov. **1958** 1 p. of text. 9 refs., 24 charts. Mimeo. **DWB** (M77.2/661 F873ca)—Annual and monthly charts present the number of days with rainfall and the rainfall amounts in mm for French West Africa. The rainfall normals are calculated from rainfall observations from 1921–1950. *Subject Headings:* **1. Rainfall distribution 2. French West Africa.** —*A.V.*

10M–42 551.577.2:551.553.21(497.1)

†§Furlan, Danilo, **Razporedba padavin v Jugoslaviji kot odsev "monsunskega" strujanja v Evropi.** [The distribution of precipitation in Jugoslavia considered as a reflex of "monsoons" in Europe.] *Geografski Vestnik*, Ljubljana, No. 29/30:141–168, **1958.** 16 figs., 38 refs. **DLC.** The questions whether term "monsoon" is justifiable in Europe and what the difference between the present conception of the monsoon and the earliest theory of HARDLEY is, are discussed. Jugoslavia presents three different fundamental types of precipitation distribution: in northern regions the precipitation maximum occurs in summer, in the northwest it occurs in autumn, and in the extreme south in winter. Since precipitation distribution was the same in 1956 an analysis of synoptic conditions with respect to precipitation characteristics in 1956 seems to be of general interest. Numerous cases of precipitation were analyzed in relation to the mean temperature distribution at the 500 mb surface. The analysis indicates that precipitation from July 15–18, 1956, corresponded to the summer monsoon and that of Feb. 17, 1956, to the winter monsoon. For all the cases, precipitation was the result of fronts. Recent analyses have proved that precipitation in the region between the Indus and Sakhalin Rivers is of the same origin, so that the term "monsoon" is fully justifiable in Europe. As to the second question, it is believed that the early interpretation of the phenomenon remains valid without alteration or complement as concerns the winter monsoon. As regards the summer monsoon, one must take into account that the low pressure zone over the continent renders the outbreak of cold air possible and thus attracts the polar front. It is only its presence which creates a labilization sufficient to produce a convection strong enough in the regions which possess the required humidity rate. Diurnal convection, which is exclusively thermal and does not depend on fronts, is not sufficient to produce precipitation. The early interpretation asserting that the difference between the radiation balances of land and sea is the principal, although

not the sole, motor of periodic winds remains thus valid. *Subject Headings:* **1. Precipitation distribution 2. Synoptic conditions for precipitation 3. Monsoons 4. Jugoslavia.**—*A.V.*

10M–43 551.577.2:621.311.21(446.3)

Garenc, Paule, **Les aménagements hydroélectriques du bassin de la Vienne.** [The hydroelectric installations of the Vienne Basin.] *Annales de Géographie*, Paris, 61(324):106 122, March/April **1952.** 5 figs., 6 plates, refs. **DLC**—A small chart shows annual rainfall in various parts of the Vienne Basin and is accompanied by a brief description of the rainfall regime in the several tributaries. The remainder of the article deals with stream flow, runoff, hydroelectric installations, and the economic importance of these. *Subject Headings:* **1. Precipitation distribution 2. Hydroelectric installations 3. Vienne Basin, France.**—*M.R.*

10M–44 551.577.2(61)

Griffiths, J. F. (*East African Met. Dept., Nairobi*), **Annual rainfall distribution in East Africa.** *Nature*, London, 181(4619):1331, May 10, **1958. DWB**—Since the distribution of annual rainfall at Padua (longest record in world) was found to be normal for 225 years, it was assumed that the normal distribution held for any place in the world. An analysis of 30 stations in East Africa with >30 years of record shows areas with rainfall not normally distributed in the West and drier areas, except for Nairobi in Kenya and Gulu in NE Uganda. In all, 21 out of 30 stations had distributions not significantly anomalous. Eight were not normal. Two stations 8 miles apart show normal and abnormal distributions. Eventually 240 stations with >30 years record will be tested. *Subject Headings:* **1. Annual rainfall distribution 2. Rainfall anomalies 3. East Africa.**—*M.R.*

10M–45 551.577.2(46) 551.579(46)

*Masachs Alavedfa, Valentin (*Manresa Institute, Spain*), **Regimen hidrografico de los derrames fluviales del nudo de los Montes Universales.** [Hydrographic regime of the river outlets of the Montes Universales.] *Barcelona. Instituto Geológico, Miscelánea Almera*, 7:1–37, **1948.** 8 figs., tables, refs. p. 35–36. **DWB**—An annual precipitation map is constructed on the basis of rather meager data with varying periods from 1–13 years. Data for snowfall and seasonal distribution of rainfall are presented as well as for temperature conditions. Orographic effects on local climate are briefly outlined. Other analyzed factors include the relief, geological conditions and vegetation. Available runoff data are given. *Subject Headings:* **1. Hydrologic regime 2. Precipitation distribution 3. Precipitation charts 4. Montes Universales, Spain.**—*A.A.*

10M–46 551.577.2:551.515.13(410)

Sawyer, John Stanley, **Rainfall in the British Isles resulting from depressions which pass eastward between Scotland and the Faeroes.** *Great Britain. Meteorological Research Committee, M.R. Paper*, 748, August 31, 1952. 4 p. 7 figs., 2 tables. Mimeographed. **DWB**—Rainfall charts were drawn for 61 frontal depressions, and expressed as averages, standard deviations and medians, and charts are drawn for types classified by fronts crossing the British Isles. Rainfall was investigated in relation to various parameters and a few significant correlations found, but none of these are likely to improve on forecasts based on synoptic experience. *Subject Headings:* **1. Cyclone tracks 2. Precipitation distribution 3. British Isles.**—*C.E.P.B.*

10M–47 551.577.2:551.515.13(410)

Sawyer, John Stanley, **Rainfall of depressions which moved eastward across the British Isles between the Bristol Channel and the Scottish border.** *Great Britain. Meteorological Research Committee, M.R. Paper*, 762, Oct. 30, **1952.** 5 p. 7 figs., table. Mimeo. **DWB**—Average rainfall and standard deviation of 45 depressions are charted for British Isles, with profile across track and frequency distributions. Amount was correlated with various parameters, giving a regression equation: $R(\text{mm}) = 15.9 - 0.18V - 0.23(p - 1000) - 0.092(\theta - 90)$, V = speed of depression in kts, p = central pressure of depression, θ = orientation of track in degrees from north; total correlation 0.60. *Subject Headings:* **1. Cyclone tracks 2. Precipitation distribution 3. British Isles.**—*C.E.P.B.*

10M–48 551.577.2:551.515(73)

*Schoner, R. W. (*Hydrologic Services Div., U. S. Weather Bur., Washington, D. C.*), **Frequency and distribution of areal rainfall averages associated with tropical storms entering the coast of the United States (Texas to Maine).** Washington, D. C., U. S. Weather Bureau, July **1957.** 17 p. incl. 3 figs., 6 refs., 77 figs., 7 tables. Reproduced from typescript. **DWB** (M15.2 U587fr)—Information on the frequency and distribution of areal rainfall averages associated with tropical storms that enter the coast of the U. S. from Texas to Maine, has been compiled from the data obtained from various Weather Bureau stations in this particular region. Results from the seven selected zones are tabulated. Means of obtaining the areal—average precipitation values, as well as the use of such precipitation data, are included in this report. The paper contains numerous

data for the zones. *Subject Headings:* **1. Tropical rainfall 2. Areal rainfall frequencies 3. Areal rainfall distribution 4. United States.**—*N.N.*

10M-49 551.577.2:551.515(521.12)

Sekine, Y., **On the relation between the type of disturbance and the movement of rainfall distribution in Iwate Prefecture.** *Journal of Meteorological Research*, Tokyo, 10(8):648–654, Aug. **1958.** 12 figs., 3 tables, 3 refs. In Japanese; English summary p. 648. **DLC**—Reprinted in *Sendai, Japan. Central Meteorological Observatory, Journal of Meteorological Research of Tohoku District*, Vol. 12, Memoir No. 4, March **1959. DWB**—The relation between the type of disturbance and the movement of rainfall distribution is examined on the basis of data of a dense network of self-recording rain gages in Iwate Prefecture. The study shows that the movement of rainfall distribution is characterized by a correlation coefficient between accumulated rainfall amount and the total rainfall amount, and that a disturbance causes rainfall in Iwate. The Prefecture is classified into 6 types, and the relation between the type of disturbance and type of rainfall distribution is tabulated and graphed, as well as the movement of rainfall distribution. *Subject Headings:* **1. Rainfall area movement 2. Atmospheric disturbance-precipitation relationships.**—*Author's abstract.*

10M 50 551.577.31(54)

*Seshachar, C., **Discussion of hourly rainfall and associated wind direction at Bangalore.** *India. Meteorological Dept., Scientific Notes*, 9(102):15–28, **1946.** 5 figs., 13 tables, 4 refs. **DWB**—This paper analyses the hourly rainfall records of the Bangalore Observatory based on data for the years 1895–1934. Tables showing hourly distribution of rainfall, total number of hours of rain and average rainfall per rain-hour in various months and seasons of the year are given. A table showing how the rainfall and number of rain-hours are related to wind from different directions is also given. Percentage probability of rainfall with associated winds from different directions has been tabulated for each month. Precipitation is most frequent and heavy during the evenings and the early part of nights during all the seasons. Forenoons get generally the least amount of rain. Thus convection is the chief cause of rainfall over Bangalore. Tables and diagrams comparing the hourly distribution of rainfall over Bangalore with that over Madras are given. There is a resemblance only during the southwest monsoon when convection is the main cause of precipitation at Madras. Most of the rainfall measured at Bangalore is associated with westerly winds and the least amount of rain occurs during calm weather. As in the case of other Indian stations winds from the least frequent directions have the greatest association with rain. *Subject Headings:* **1. Diurnal rainfall variations 2. Rainfall distribution 3. Bangalore, India.**—*Author's abstract.*

10M-51 551.577.3(439.1)

*Szakács, Mrs. György, **Az 1953–54. évi tél csapadékviszonyai.** [Precipitation conditions of the winter 1953–54.] *Beszámolók az 1955-ben vegzett tudományos kutatásokról. (Hungary. Országos Meteorológiai Intézet, Hivatalos Kiadványai*, Vol. 20, pub. **1935.**) p. 97–105. 14 charts. Hungarian, Russian and French summaries, p. 97. **DWB**—Data on precipitation in Hungary during the period Dec. 1953–Feb. 1954 are presented in charts. The values shown are: 1) distribution of total precipitation; 2) distribution in percent of normal; 3–10) snow cover depth on various dates from Dec. 31 to March 1; 11) duration of snow cover in percent of normal; 12) maximum snow cover depth; 13) maximum snow cover in percent of average maximum cover; and 14) number of days with snow cover in percent of normal. A 40-year period was used for the normals of precipitation record and the period 1929/44 for the normals of snow cover. Among the cold winters of the century 1953/54 is found to reach 3rd to 5th with respect to persistence of snow cover. *Subject Headings:* **1. Precipitation distribution 2. Precipitation normals 3. Snow cover data 4. Hungary.**—*G.T.*

10M-52 551.577.2

Tabata, Shichiro, **A simple method for calculating D.D.A. values.** *Journal of Meteorological Research*, Tokyo, 9(7):536, July **1957.** 2 figs., eq. In Japanese. **DWB, DLC**—The lattice method for calculating D.D.A. values consists of calculating total rainfall in an area of a certain shape by summing the products of average rainfall in each section and numbers of points (which are formed by unit square lattices covering the area) in some rainfall section. D.D.A. is obtained by total rainfall divided by total area. The total area can be calculated by multiplying the total length of parallel lines equally apart and the unit distance between parallel lines. *Subject Heading:* **1. Areal rainfall calculation.**—*J. Woo.*

10M-53 551.577.2(521.12)

Takahashi, K., **On the differences of precipitation between Ishibuchi and Mizusawa.** *Sendai, Japan. Central Meteorological Observatory, Bulletin of the Meteorological Society for Research of Tohoku District*, 8(2):509–515, Jan. **1955.** 6 figs., 3 tables, 4 refs. In Japanese; English summary p. 509. Also in: *Journal of Meteorological Research*, Tokyo, 6(10/11):509–515, Dec. **1954. DWB**—

The author analyzed the difference in the amount of precipitation between Ishibuchi and Mizusawa, which are about 23 km apart. Most of these differences remained within 20 mm, and the days with a difference of more than 20 mm compared 26 in a total of 418 days. These cases are frequently produced by the convergent air current between two stations. It was found that ESE or SE wind caused larger amounts of precipitation in Ishibuchi than in Mizusawa and warm frontal thunderstorms moving from south to north, brought more precipitation to Mizusawa than to Ishibuchi. *Subject Headings:* **1. Precipitation amount 2. Precipitation distribution 3. Ishibuchi, Japan 4. Mizusawa, Japan.**—*Author's abstract.*

10M–54 551.577.2:551.553.21(54)

***Weather, post-monsoon season October-December 1953.** *Indian Journal of Meteorology and Geophysics*, 5(2):192–194, April **1954.** fig. **DWB**—A map shows the rainfall distribution in India for the period Oct.–Dec. 1953 (% deviation from normal), and the behavior of the monsoon during this period is described. *Subject Headings:* **1. Postmonsoon season 2. Rainfall distribution 3. India.**—*I.L.D.*

10M–55 551.577.2(552.2) 551.577.1

Yoshizawa, Z., **On the distribution of precipitation in Ehime.** *Journal of Meteorological Research*, Tokyo, 4(9):643–647, Feb. **1953.** 3 figs., 5 tables, ref. In Japanese; English summary p. (40). **DWB**—Precipitation in Ehime Prefecture is classified into several types according to its relation to various synoptic situations. The geographic distribution of intensities of each type is illustrated and discussed. *Subject Headings:* **1. Precipitation distribution 2. Precipitation classification 3. Ehime Prefecture, Japan.**—*G.T.*

10M–56 551.577.2(436.14) 551.577.37(436.14)

Zawadil, Rudolf (*Vienna*), **Niederschlagsverteilung und ergiebige Regenfälle im Wiener Raum.** [Distribution of precipitation and heavy rains in the Vienna area.] *Austria. Zentralanstalt für Meteorologie und Geodynamik, Jahbuch*, **1951**:D21–D35. 9 figs., 2 refs. **DWB**—A detailed study of the local precipitation climate in the vicinity of Vienna. Author presents monthly seasonal and annual distribution charts (1873–1947); shows the change from season to season and the seasonal percentage; classifies moist and dry zones; gives charts for selected months and, finally, 15 charts for selected excessive rains dependent on different weather conditions. *Subject Headings:* **1. Precipitation distribution 2. Excessive rainfall 3. Vienna, Austria.**—*A.A.*

PRECIPITATION AMOUNT (551.577.21)

10M–57 551.577.21(764)

Dunham, Hoye S. (*U. S. Weather Bureau, Austin, Tex.*), **Texas rainfall during the 1957 water year.** *Texas A. and M. College, College Station, Proceedings of the 3rd Annual Conference on Water for Texas, Sept. 1957*, (issued **1958?**). p. 11–15. 8 figs. **DWB** (M79 C748pro), **DLC** (TD201.T37)—The rainfall pattern shows that variability of precipitation is one of the major problems in hydrology. A new approach concerning a hydrological tool is discussed. *Subject Headings:* **1. Rainfall amount 2. Texas.**—*N.N.*

10M–58 551.577.21(437.11)

Gottwald, Aleš (*Met. Inst. Prague Univ.*), **Příspěvek ke srážkovým poměrum Prahy.** [Precipitation conditions of Prague.] *Meteorologické Zprávy*, Prague, 11(6):162–165, **1958.** 2 figs., 3 tables, 7 refs. **DWB, DLC**—In an earlier article by J. Jílek (*see* 10.4–265, April 1959, *Met. Abs.*) on precipitation in Bohemia, 1876–1957, precipitation amounts occurring with a frequency of 50% were considered as "normal" amounts. In the present article by Gottwald the range of "normal" precipitation is much narrower and a much more extensive scale of precipitation amounts is being used. This contribution could give rise to a discussion on what values should be considered as normal in climatology. *Subject Headings:* **1. Precipitation amount 2. Precipitation normals 3. Prague, Czechoslovakia.**—*Transl. of Editor's note.*

10M–59 551.577.21(410)

*Great Britain. Ministry of Town and Country Planning, **Rainfall map of Great Britain. Annual average, 1881–1915.** London, Director General, Ordnance Survey, **1949.** 2 sheets folded to 27×32 cm. Colored. Price: 5/– net. **DWB**—These two huge charts give detailed annual isohyets for: 1) Scotland and neighboring islands, and 2) England and Wales in many colors (or shades of blue). In addition there are dispersion graphs for a number of representative (individual) stations, showing for each the distribution of rainfall for each month of the year for each year from 1881–1915, and the median, the mean, the interquantile range as well as extreme values and dis-

persion of values lying between extremes. *Subject Headings:* **1. Isohyetal charts 2. Rainfall distribution 3. England 4. Scotland. I. Scotland. Dept. of Health.**—*M.R.*

10M–60 551.577.21(665.7) 551.508.74

Guimarães, D. (*Chefe do Serviço Meteorológico da Guiné*), **As chuvas na Guiné Portuguesa.** [Rains in Portuguese Guinea.] *Boletim Cultural da Guiné Portuguesa*, Lisbon, 13(47):315–332, July **1957.** 5 photos, 11 maps (in color fold). **DWB**—These monthly and annual isohyetal charts show in vivid colors (14 colors for July chart which has a range from <200 to >800 mm in intervals of 50 mm) the extreme variability of rainfall from north to south (13°N to 11°N latitude) and from month to month. The monsoon rains are at their peak in July and Aug. and spread from south to north in June and retreat back toward the south in Sept. Annual values vary from <1250 to >2750 mm from northeast to southwest. The rainfall and network, as of 1956, is described and stations are listed. Several types of rain gages are illustrated and discussed. A drosometer (Duvdevani) located at Bissan Observatory, is also illustrated and discussed. The service was reorganized in 1951, and technical missions conducted during the few years up to 1956. *Subject Headings:* **1. Precipitation distribution 2. Rainfall networks 3. Isohyetal charts 4. Portuguese Guinea.** —*M.R.*

10M–61 551.577.21(521.71)

Hattori, H., **On the rainfall amount distribution in Shima Peninsula, Pt. 1.** *Journal of Meteorological Research*, Tokyo, 10(3):231–233, March **1958.** 4 figs., 3 tables, 2 refs. In Japanese. **DWB, DLC**—An area of 380 km² in Shima Peninsula was divided into 15 units (each 25 km²) for a statistical study covering 46 examples of rainfall exceeding 10 mm from July, 1952 through Sept. 1953. Surface weather charts indicate that at most 35% of the cases were caused by cyclones passing through the Pacific coast and 25% by cyclones passing through the Sea of Japan. An empirical equation of mean rainfall at a typical observatory and a variation of areal mean rainfall depth with distance are tabulated. *Subject Headings:* **1. Rainfall amount 2. Statistical studies of rainfall 3. Shima Peninsula, Japan.**—*W.N.*

10M–62 551.577.21:551.45(540)

Jensen, Kr. M., **Gennemsnitsvaerdierne i relation til de absolutte nedbørsmaengder i Den Indiske Ørken.** [The relationship between average and absolute precipitation amounts in the Indian desert.] *Geografisk Tidsskrift*, Copenhagen, 52:159–168, **1952/53.** graphs, 6 refs. **DWB**—The use of mean precipitation amounts in describing the climatology of arid regions and vegetation limits in plant geography is questioned. The annual rainfall distribution over a period of 30 years is analyzed for Ajmer, Jodhpur, Bikaner and Jaipur and graphed. The irregular interannual and innerannual rainfall distribution is pointed out. The significance of this phenomenon to plant growth is stressed and the need for considering extreme values in climatological description is emphasized. *Subject Headings:* **1. Desert climates 2. Rainfall distribution 3. Precipitation amounts 4. India.**—*I.L.D.*

10M–63 551.577.21(520)

Kusakabe, M. (*Kukuoka District, Met. Obs.*), **Rainless periods for Fukuoka on the potential-evapotranspiration basis.** *Journal of Agricultural Meteorology*, Tokyo, 14(2):54–56, Oct. **1958.** 4 figs., 2 tables, 12 refs. In Japanese; English summary p. 56. **DWB**—There has been no objective and reasonable criterion in determining the rainless periods when for a practical purpose it is desired that any particular days, which actually had a certain amount of precipitation during those periods, are still counted as rainless. The author shows that a day may be considered as rainless when the daily amount of precipitation on that day is less than the value of the corresponding potential evapotranspiration which is to be obtained from the daily mean temperature. From those rainless periods thus obtained for Fukuoka covering the last 30 years, each of which lasted for more than 10 days, the number of their occurrences according to duration, and the season of the year for which they are liable to occur, are studied. As to those rainless periods, it is not their lengths of duration but their "intensities" that are important. Then, expressing the indices for such intensities of rainless periods by the water losses which occurred throughout the whole period, the number of occurrences according to the indices, and the season of the year in which these periods are apt to occur, are also studied. *Subject Headings:* **1. Dry spells 2. Fukuoka, Japan.**—*Author's abstract.*

10M–64 551.577.21:551.588.2(520)

Matsuno, Masumi; Nishina, Nobuhiko; Yamanaka, Kunitoshi et al. (*all, Central Met. Obs.*), **Determination of the distribution of the amount of precipitation according to altitude.** *Journal of Agricultural Meteorology*, Tokyo, 8(12):45–51, March **1953.** 2 figs., table, ref. In Japanese; English summary p. 51. **DWB**—The monthly and annual amount of precipitation in mountain and coastal regions is divided into three types. The relation between elevation and precipitation is

analyzed and a method for determining the distribution of monthly and annual precipitation is presented. *Subject Headings:* **1. Precipitation classification 2. Altitude influences 3. Precipitation distribution. I. Kubo, Jiro.**—*I.L.D.*

10M–65 551.577.21:615.834(438)

Chełchowski, Włodzimiefz, **Anomalie opadowe 1891–1930 w polskich uzdrowiskach miejścowosciach klimatycznych, wszasowskach i punktach turystycznych.** [Precipitation anomalies (1891–1930) in the Polish spas and tourist localities.] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, 8(2):137–140, **1955.** 2 tables, 6 refs. English summary p. 140. **DWB, DLC**—According to rules in force in Czechoslovakia a locality may be registered as a health or tourtist resort only in case the annual precipitation does not exceed 90% of a theoretical annual amount for the given altitude calculated on the basis of A. Gregor's empirical formula $S = 560 + 0.6h$ where S is the annual precipitation and h the altitude above sea level. A table giving the ratio of annual precipitation amounts to theoretically computed annual precipitation of 109 health resorts for the years 1891–1930 shows that only a few Polish health resorts are up to these requirements. Precipitation conditions are particularly unfavorable in the Polish foothills of the Tatra Mountains, while they are much better on the Czech side of the Tatras. *Subject Headings:* **1. Health resorts 2. Precipitation anomalies 3. Precipitation amount 4. Poland.**—*A.M.P.*

10M–66 551.577.21:551.511:551.571(522) 551.509.324.2

Nagahama, M., **On the relation between water vapour transport and rainfall amount over Southern Kyushu (On the forecasting of rainfall amount caused by low passing through Southern Kyushu, Pt. 1).** *Journal of Meteorological Research*, Tokyo, 10(7):618–619, July **1958.** 2 figs. In Japanese. **DWB, DLC**—An equation for determining the magnitude of the water vapor transport over southern Kyushu is derived by balancing water vapor transport rate and integrating between barometric pressures from the surface to 500 mb. Trial calculations of 4 heavy rainfalls from 1954–1956 are made. Graphed data are given. Rainfall data based on a certain area are more significant than those based on one location. *Subject Headings:* **1. Rainfall forecasting 2. Water vapor transport 3. Japan.**—*J. H. Woo.*

10M–67 551.577.21:551.577.52(437.1)

*Picko, Václav and Bartoníček, Milos, **Výsledek analysy rozptylu jako indikace polohy mista se zřetelem k ovzdušnym srážkám.** [Results of a study of the effect of location on precipitation by means of variance analysis.] *Meteorologické Zprávy*, Prague, 10(5):125–129, **1957.** 5 tables, 3 refs. Russian and German summaries p. 125–126. **DWB**—Monthly precipitation values for 22 stations in Bohemia are examined by means of variance analysis in order to determine the significance of deviations from normal precipitation values. Six stations are found to have precipitation amounts within the limits of statistical variance; nine stations show significant negative deviations (downwind locations), while seven show significant positive deviations (upwind location). Significance of monthly variations is also analyzed. *Subject Headings:* **1. Precipitation distribution 2. Precipitation variability 3. Bohemia, Czechoslovakia.**—*G.T.*

10M–68 551.579:519.2 551.577.21(494.5)

Rima, Alessandro, **Delle "probabilita" nelle misurazioni idrografiche e meteorologiche nella Svizzera italiana.** ["Probabilities" in the hydrographical and meteorological measurements made in Italian-speaking Switzerland.] *Rivista Tecnica della Svizzera Italiana*, No. 6:1–15, Lugano **1958.** 26 figs., 2 tables, 22 refs., eqs.—Taking as a basis the data of meteorological, pluviometric and limnimetric stations of Italian-speaking Switzerland (Ticino and Mesolcina), the author investigates the statistical distribution of the annual and monthly amounts of precipitation and runoff. *Subject Headings:* **1. Precipitation distribution 2. Runoff 3. Statistics 4. Switzerland.**—*A.V.*

10M–69 551.577.21:551.588.2(82)

Rohmeder, Guillermo (*Nat. Tucuman Univ.*), **La real distribucion de las lluvias en Tucumán.** [Real distribution of rain in Tucumán.] *Tucumán, Argentina. Universidad Nacional. Instituto de Estudios Geográficos, Publicaciones Especiales*, No. 2:183–191, **1951.** fold. diagrs., 3 refs. German summary p. 190–191. **DWB**—The distribution of rain gages in Tucumán Province, Argentina, is more "practical" than representative—95% being installed in the narrow plains region, whereas the mountain region is almost neglected. A fairly detailed isohyetal chart is nevertheless, presented, showing the general N-S orientation of the lines, with the dryest areas to the E and the most humid to the W in the eastern portion, and the reverse situation in the western portion (dryer in the high mountains). It is dryer on the N slopes where evaporation is also greater. The maximum belt of precipitation is not in the plain but on the slopes of the mountains. *Subject Headings:* **1. Isohyetal charts 2. Orographic influences 3. Tucumán Province, Argentina.**—*M.R.*

10M–70 551.577.21:551.515.2(52)

Sakuma, K.; Arai, T. and Araki, K., **A note on the distribution of rainfall amount.** *Journal of Meteorological Research*, Tokyo, 3(13):455–457, Nov. **1951.** 2 tables, 2 figs. In Japanese; English summary p. (29). **DWB**—The authors investigated precipitation data in the Isohara-machi area, Ibaragi Prefecture, as a function of gage density. Precipitation amounts due to the typhoon "Missatha" are tabulated and presented on 2 charts representing records from 8 and 17 stations, respectively. It is found that the latter show considerably higher results and the authors suggest that the number of stations operating at present is still insufficient. Precipitation amounts and corresponding water levels of the rivers Okita, Kisara and Hanazono are tabulated. *Subject Headings:* **1. Rainfall distribution 2. Typhoon rainfall 3. Isohara-machi area, Japan 4. Ibaragi Prefecture, Japan.**—*G.T.*

10M–71 551.577.21(521.12):551.579.1

Sendai District, Japan. Central Meteorological Observatory; Morioka, Japan. Weather Station and Iwate, Japan. Prefectural Office, **A study on rainfall amounts over the basin areas of the branches of the Kitakami River in 1953.** *Journal of Meteorological Research*, Tokyo, 7(9):581–585, Oct. 1955. 4 figs., 3 tables, eq. In Japanese; English summary p. 581. **DWB, DLC.** Also issued as: *Sendai, Japan Central Meteorological Observatory, Bulletin of the Meteorological Society for Research of Tohoku District*, 9(1):59–63, Nov. **1955.** In Japanese; English summary p. 59. **DWB**—In order to determine hydrometeorological condition in area supplying water to the dams to be constructed in the basin of the Isawa, Sarugaishi and Waga Rivers tributaries of the Kitakami River, observations on rainfall and runoff amounts in these basins were made from July to Oct. 1953. In the upper basin of the Isawa River, topographic conditions are complicated and there is no distinct regularity in the variation of rainfall amounts with height, while in the upper basin of the Sarugaishi River, where the topography is rather simple, rainfall amounts increase with height for heavy rain, but are uniformly distributed for weak rain. To obtain the areal rainfall amounts, three methods were used, but no significant difference between the results of these methods was found. The values obtained by the prospect chart of rainfall amount over the upper Isawa River basin are compared with observed values, showing that the prospect method by chart is fairly effective. *Subject Headings:* **1. Rainfall amount 2. Water supply 3. Japan. I. Japan. Central Meteorological Observatory II. Iwate, Japan. Prefectural Office.**—*From author's abstract.*

10M–72 551.577.21:551.515.2(52–15) 551.577:519.241.2

Suzuki, E., **Statistical study on the amount of precipitation, Pt. 10, Geographical distributions of the total amount of precipitation caused by each typhoon in the western part of Japan.** *Journal of Meteorological Research*, Tokyo, 11(4):262–268, April **1959.** fig., 5 tables, 2 refs., eqs. In Japanese; English summary p. 262. **DWB, DLC**—Component analysis procedure in multi-variate statistical analysis may be quite suggestive for the phenomenological explanation concerning the geographical distribution of element such as precipitation caused by each typhoon. As the results of extraction of the principal and the second components from the total geographical distribution, it was found that 81% of total variance could be explained by the above two components, and the following explanations were given from the several synoptic considerations. (1) The principal component ξ_1 was mainly dependent on some factors of each typhoon itself, i.e., variance between typhoons. (2) The second component ξ_2 was greatly dependent on the geographical distribution of precipitation caused by the same typhoon, i.e., variance within typhoons. At last, the essential meaning of empirical orthogonal function and screening analysis procedure, introduced in weather forecasting by E. N. Lorenz and others recently, were pointed out to be reduced to the component analysis mentioned above. *Subject Headings:* **1. Typhoon precipitation distribution 2. Statistical analysis of precipitation 3. Japan.**—*Author's summary.*

10M–73 551.577.21:517.512.2

Tsuchiya, S., **On the periodogram analysis of the amount of precipitation in Tohoku District.** *Journal of Meteorological Research*, Tokyo, 4(7):359–362, Oct. **1952.** In Japanese; English summary p. (24). **DWB**—The author analyzes the monthly amount of precipitation in various districts of Tohoku (Aomori, Miyako, Ishinomaki, Fukushima, Yamagata, Akita, Mizusawa and Niigata) by applying the method of periodogram analysis and considering the geographic distribution. Several probable periods are identified for the purpose of long-range forecasting. *Subject Headings:* **1. Precipitation amount 2. Periodogram analysis 3. Long-range forecasting 3. Tohoku District, Japan.**—*Author's abstract.*

10M–74 551.577.21(496)

Turkey. Devlet Meteoroloji Isleri Umum Müdürlügü, **Türkiyede Yillik ve Mevsimlik Ortakalama Yagis Dağilisi.** [Annual and seasonal average rainfall distribution in Turkey.] Basvekaiet Devlet Matbassi, **1953.** 1 sheet folded, 60×76 cm. 5 maps in color. Scale, 1:6,000,000. **DWB**—

Multicolored seasonal and annual isohyetal charts based on data for about 100 stations for perio 1929–1952. *Subject Headings:* **1. Precipitation data 2. Isohyetal charts 3. Turkey.**—*M.R.*

10M–75 551.577.21(45

Visentini, Marco and Vanni, Manfredo, **La contribution de l'Italie à l'étude des condensation atmosphériques.** [Contribution of Italy to the study of atmospheric condensation.] *Internationa Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957, [Trans actions]*, Vol. 2, pub. **1958.** p. 458–459. 12 refs. **DWB** (M(06) 1611g)—This is a brief report o the contribution of Italy to the study of atmospheric condensation or precipitation in order to deter mine the amount that is actually experienced in their area where snow and glaciers make the climat very cold and humid. *Subject Headings:* **1. Precipitation studies 2. Precipitation amount 3. Italy** —*N.N.*

PRECIPITATION DURATION (551.577.22)

10M–76 551.577.22

Bontrond, E. A., **La durée des précipitations.** [Duration of precipitation.] *La Météorologie* Paris, Ser. 4, No. 52:245–262, Oct./Dec. **1958.** 10 figs., 8 tables. French, English and Spanish summaries p. 245. **DWB**—The author proposes to calculate the duration of precipitation during a given period from synoptic records made during that period. He is thus led to establish 3 formula based on the hypothesis of a random distribution of precipitation—a hypothesis confirmed by experi ment. Comparing his results with true values of precipitation duration in various regions, he concludes that those formulas give satisfactory results, taking into account the fact that each of them applies more precisely to a different type of climate. Comparing the experimental results regarding the duration of precipitation and the height of water collected, the author finds a correlation between the two. The subjective nature, however, of the estimates of precipitation is an obstacle to the establishment of statistics starting from local observations. The author proposes an objective method for estimating precipitation, which eliminates this source of errors. He considers that after all it is possible to define, with a very satisfactory accuracy, the ratio between the total duration of precipitation and the number of synoptic records where they appear and to allot to it a value for each of the types of climates he is considering. *Subject Heading:* **1. Precipitation duration calcula tion.**—*Author's abstract.*

10M–77 551.577.22

Drozdov, O. A., **Prodolzhitel'nosti vypadeniia osadkov kak klimaticheskaia khrakteristika.** [Duration of precipitation as a climatic feature.] *Vsesoiuznyĭ Geograficheskiĭ s"ezd, 2nd, Leningrad, 1947, Trudy*, 2:217–226, **1948.** 3 figs., table. **DLC**—Neither the rainfall amount in a certain period, nor the number of days with rainfall (of various duration and intensity) give an idea of the weather during the period studied. W. Köppen, in 1880 introduced a method of calculating the total and the mean duration of rainfall by means of the formulas $S=rN/n$ and $m=rN/nd$. This method adopted in Japan, England and Germany was never accepted in Russia because of the distrust of indirect methods and was finally introduced there after 1941, due to the insistence of the author. Information on the probability of precipitation for the European U.S.S.R., which allowed determination of the duration of rainfall was first obtained by V. N. Korotkevich. It became clear on the basis of his work that in the Russian plain the diurnal range in precipitation occurrence is not great, and that close agreement between means (of 3 daily observations) with the mean daily probability of rainfall is to be expected. An analysis of the precipitation regime in the European U.S.S.R. (Leningrad) shows that, although there is a very small difference in the number of days with rainfall during the various seasons, the seasonal difference of the mean rainfall duration and, especially, of the season's summary rainfall duration, are very great. While precipitation during a rainy day in summer continues for 4–5 hours on the average, its duration is about 10 hours in November. The total duration of precipitation varies from 60 hours in July to 269 hours in December. This characteristic difference in the duration of precipitation in the warm and cold seasons is peculiar to a large part of the continent. Further surveys on the basis of data from 84 stations in the U.S.S.R., 13 stations in Mongolia, and 32 stations in Japan the duration of precipitation in various physiographic zones, such as the tundra, the forest (taiga), forest-steppe, steppe, desert and sub-tropical zones, and discusses the influence of mountains on the amount and duration of precipitation and points out the practical importance for national economy of the calculation of these data. *Subject Headings:* **1. Rainfall duration 2. Rainfall duration frequencies 3. Precipitation regime.**—*A.M.P.*

10M–78 551.577.22:001.4

Johannsen, Hans Hinnerk, **Niederschlagstage-Niederschlagssummen.** [Precipitation days-precipitation amounts.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 42: 221–223, **1952.** 2 figs., 6 refs. **DWB**—Mean annual numbers of days with equal to or exceeding

0.1, 1 and 10 mm are plotted against annual rainfall R for numerous stations. The first shows no relation, the second a slight increase with increased R; the third is given very closely by $z = (R - 300)/3.5$. From this author deduces that the best criterion of a day with rain is 0.3 mm or more. *Subject Headings:* **1. Rainfall data analysis 2. Definitions.**—*C.E.P.B.*

10M–79 551.577.22(624)

*Sudan. Meteorological Service, **Rain-day averages: 1921–1950.** Its *Pamphlet*, No. 4, March 1955. 9 p. almost entirely tables. **DWB**—Statistical data are presented on the monthly and annual average number of rain days over the period 1921–1952 for 201 stations in the Sudan and monthly and annual average rain intensities for a number of long period stations. *Subject Headings:* **1. Rain days 2. Rainfall intensities 3. Long period records 3. Sudan.**—*I.L.D.*

PRECIPITATION VARIATIONS (551.577.3)

10M–80 551.577.3(54)

*Balasubramaniam, C. and Krishnan, K. A. (*both, Agric. Res. Inst., Coimbatore*), **A note on the variation of rainfall in Malabar.** *Indian Journal of Meteorology and Geophysics*, Delhi, 5(4):341–342, Oct. 1954. tables, eq. **DLC**—Rainfall data for 9 taluka headquarters (5 on coast) for 1926–52 (27 years) are analyzed for variance between stations and from year to year, according to FISHER'S (1938) method. The variation between years annual rainfall is high and between July rainfalls very high—much greater random or error variance. Small but significant variance occurs from place to place. The random error for 5 places on coast is greater than the error due to location. Hence it is concluded that these five places form a separate homogeneous rainfall unit. *Subject Headings:* **1. Rainfall variations 2. Rainfall distributin 3. Malabar Coast, India.**—*M.R.*

10M–81 551.577.3(494.28)

Hörler, A., **Auswertung von 30 jährigen Aufzeichnungen der Regenmessstation Rotmonten in St. Gallen.** [Results of 30 years pluviometric measurements at St. Gallen-Rotmonten.] *Schweizerische Zeitschrift für Hydrologie*, Basel, 20(1):30–40, **1958.** 4 figs., 3 tables, 5 refs. **DLC**—The author applies a method developed by Reinhold (Darmstadt) to the analysis of rainfall intensity statistics deduced from raingage recordings. The object of these studies is to give the necessary data to engineers for canalization planning. *Subject Headings:* **1. Rainfall intensities 2. Rainfall intensity calculation 3. St. Gallen, Switzerland.**—*A.V.*

10M–82 551.577.3(437)

*Jařabáč, Milan, **Srážkové poměry školního závodu lesnické fakulty v Brně.** [Precipitation conditions in the forest property of the Brno School of Forestry.] *Brno. Vysoká Skola Zemědělská a Lesnická, Sborník*, No 3/4:238–251, **1952.** 4 figs., 3 tables. Russian and German summaries p. 250–251. **DLC**—Monthly means of precipitation at nine stations on or near the Brno School of Forestry's territory are tabulated for the periods 1930–40, 1941–50 and 1930–50. Seasonal variations, and variations of the annual totals are graphically presented and discussed. *Subject Headings:* **1. Precipitation variations 2. Brno, Czechoslovakia.**—*G.T.*

10M–83 551.577.3:551.524.3(234.3)

Kaestner, Andreas, **Über Niederschlagsstruktur in den Alpen bei positiven und negativen Temperaturanomalien.** [Precipitation structure during positive and negative temperature anomalies in the Alps.] *Germany. Deutschr Wetterdienst, Berichte*, 8(54):106–109, **1959.** 8 figs., table, 2 refs. German, English and French summaries p. 106. **DWB, DLC**—Discusses for 8 alpine stations between, 700 and 3100 m, how the monthly sum of precipitation and the number of days with rain or snow depends on the mean monthly temperatures (i.e., the departure of the month in question from the mean of many years). In January there is no correlation, but in July there is at all stations a small negative correlation between the anomalies of temperature and precipitation. *Subject Headings:* **1. Temperature-precipitation correlations 2. Temperature anomalies 3. Precipitation variations 4. Alps.**—*Author's abstract.*

10M–84 551.577.3:551.579:628.1(73)

Landsberg, H. E. (*Dir., Office of Climatology, U. S. W. B.*), **United States water supplies from the sky.** *U. S. Weather Bureau, Weekly Weather & Crop Bulletin*, 44(47):6–8, Nov. 25, **1957.** 2 figs. **DWB**—Two charts of the U. S. show: 1) average annual precipitation in millions of gallons of water per capita and 2) per sq mile, by state climatic divisions. It can be seen that water availability varies tremendously within any given state. Charts represent means based on 1931–55 data, but serious variations may occur from year to year. Text mentions that even with anticipated double per capita water consumption by the end of the century only the New York and other metropolitan areas will exceed in consumption the income shown on the charts, and some areas (i.e., western

Washington) get even 18,000 times the projected requirements for year 2000. *Subject Heading* **1. Precipitation variations 2. Water supply charts 3. United States.**—*M.R.*

10M–85 551.577.3:551.577.

Langford, J. C., **Critical survey of the synoptic limitations of storm transposition.** (In- Australi Bureau of Meteorology, **Conference on estimation of extreme precipitation, Melbourne, April 195** Melbourne, Dec. **1958.** p. 91–102. 9 refs.) **DWB**—The equations computing rate of rainfall a development are discussed to determine the influence of latitude and longitude on the independe variables. While rate of rainfall varies in a measurable way, development is a function of space d mainly to nonadiabatic processes. Moreover the exact dependence is not readily assessable. R straints, revealed climatologically, are thrown on storm transposition. The fine-structure of rainfa causes exhibit a variability and a large measure of unpredictability. In the strict sense storm tran position is not justifiable. This is especially true of winter-summer transposition. Rainfall vari tions from catchment to catchment depend mainly on the latter's space relationship to the no adiabatic controls, and their position relative to the location of greatest mean intensity of the lor waves. *Subject Headings:* **1. Rainfall variations 2. Precipitation formation 3. Rainstorm tran position.**—*Author's abstract.*

10M–86 551.577.3(663.2

Legrand, J., [**Comments on**] **R. du Chaxel: La pluie à Dakar.** [Rain at Dakar.] *La Météor logie*, 4th Ser., No. 23:223–226, July/Sept., **1951.** French, English and Spanish summaries p. 223.– A long critical review of this article (*see* 2.5–139, May 1951, *Met. Abs.*) on rainfall at Dakar. *Subje Headings:* **1. Rainfall variations 2. Dakar, Senegal. I. du Chaxel, R.**—*M.R.*

10M–87 551.577.3(54

*Mouzon, Charles (*Administrateur de la France d'Outremer*), **Pondichéry: étude de géographi humaine.** [Pondichery: study of human geography.] *Acta Geographica*, Paris, No. 19, **195** 126 p. 22 figs., tables, photos. **DLC**—Normal rainfall (1881–1949), normal temperature, rainfall i dry years, in wet years, for each month of the year; variation from year to year (1939–49) in Sept June, Jan. and Nov. rainfall and hydrological or agricultural consequences of variability are treate in text and in tables and graphs in p. 26–32 of this monograph on Pondichery (located on SE coas of India near Madras) and its population and landscape. In rainy years 700 mm can fall in on month (Nov. 1940). *Subject Headings:* **1. Rainfall data 2. Rainfall variations 3. Pondichery French India.**—*M.R.*

10M–88 551.577.3(669) 551.573(669

Pugh, J. C., **Rainfall reliability in Nigeria.** *International Geographical Congress, 17th, Washing ton, Aug. 8–15, 1952, Proceedings*, pub. 1956? p. 280–285. 3 figs. **DWB** (912.6 I61p), **DL** (G56.158)—Small-scale surveys show rainfall distribution for the dry season (Oct. to Feb.), the we season (March to Sept.) and the year, and the percentage variation of annual rainfall, computed from the mean deviation and from the difference between maxima and minima. The latter, rathe rough, method was adopted for monthly values, which are plotted together with monthly maxima an minima for 21 stations. The annual course of potential evapotranspiration and soil moisture storage is discussed. *Subject Headings:* **1. Rainfall variations 2. Evapotranspiration 3. Nigeria** —*A.A.*

10M–89 551.577.3(433)551.506.3

Richel, Eberhard (*German Weather Service, U. S. Zone*), **Keine Änderung der Niederschlags verhältnisse in Süddeutschland.** [No change in precipitation in southern Germany.] *Wasser und Boden*, Hamburg, No. 12:269–272, **1951.** 3 tables. Abstracted from reprint. **DWB**—Precipitation records of 9 South German stations, most of them reaching back to 1851, have been analyzed by 10-year periods, and frequencies of wet and dry years (of various degrees) are discussed and presented in tabular and graphic form. It is found that as far as precipitation amount and frequency of extremely dry or extremely wet years is concerned, no important change can be noted. Three to 5 very dry years (less than 70% of normal) and as many very wet years (more than 130%) can be expected every 100 years in southern Germany as a regular climatic feature. Persistence of dry or wet years is also discussed. *Subject Headings:* **1. Long period records 2. Precipitation trends 3. Drought 4. Wet years 5. Bavaria 6. Germany.**—*G.T.*

10M–90 551.577.3(427)

Reynolds, G., **Rainfall at West Kirby.** *Weather*, 9(7):224, July **1954. DWB**—Notes on record kept at West Kirby, near Liverpool, by late CANON E. F. ROBSON. *Subject Headings:* **1. Rainfall variations 2. West Kirby, Cheshire, Eng. I. Robson, E. F.**—*C.E.P.B.*

10M–91 551.577.3(45)

Rimoaldi, Anna Maria, **Dispersioni non normali dei gruppi statistici e applicazioni meteorologiche.** [Abnormal dispersion of statistical series and meteorological applications.] *Rivista di Meteorologia Aeronautica*, Rome, 12(2):9–25, April/June **1952.** 3 figs., table. Italian, French, English and German summaries p. 9. **DLC**—Meteorological phenomena are examined from a climatological point of view, using the methods of statistical research suggested by the scattering theory. On the basis of an analysis of pluviometric series for Rome (130 years), Padua (150 years) and Milan (170 years) it can be safely concluded that no periodical or evolutive variation in rainfall may be said to exist in Italy. *Subject Headings:* **1. Precipitation variations 2. Statistical analysis 3. Italy.**—*Author's abstract.*

10M–92 529:634.94:551.577.3

Schulman, Edmund, **Rio Grande chronologies.** *Tree-Ring Bulletin*, Tucson, Ariz., 19(3/4): 30–33, Jan./April **1953.** 4 figs., 3 tables, refs. **DWB**—Account of dendrochronology studies in Rio Grande valley with many curves of tree ring measurement of Douglas fir back to 1350, and a comprehensive annual table 1375–1952. A qualitative agreement of ring width with runoff is found. *Subject Headings:* **1. Dendrochronology 2. Rainfall variations 3. Rio Grande.**—*C.E.P.B.*

10M–93 551.577.3(521.4)

Terasawa, H., **Precipitation on the coast of Hokuriku District.** *Journal of Meteorological Research*, Tokyo, 5(2):81–84, March **1953.** 2 figs., 2 tables. In Japanese; English summary p. 81. **DWB**—Precipitation of Hokuriku District in winter (Dec.–Feb.) is investigated from data for Tsuruga, Fushiki and Niigata (1941–1950). Precipitation variations and temperature departures are graphically represented for one-year periods preceding anomalous winter precipitation. *Subject Headings:* **1. Precipitation data 2. Precipitation variations 3. Hokuriku District, Japan.**—*From author's abstract.*

10M–94 551.577.3(436) 551.578.46(436)

*Tollner, Hanns, **Niederschlagsverhältnisse im Gebiet des Rauriser Sonnblicks.** [Precipitation conditions in the Sonnblick area, Rauris Alps.] *Sonnblick-Verein, Vienna, Jahresbericht*,49/50: 13–18, 1951–1952, pub. **1954.** 2 figs., table, 6 refs. Also his: **Schneeverhältnisse im Gebiet des Rauriser Sonnblicks.** [Snow conditions in the Sonnblick area.] *Ibid.*, p. 28 32. fig., 3 tables, refs. **DLC**—Precipitation in the Sonnblick area was measured at nine points. Annual totals (1927–1952) are tabulated and their variation with elevation is shown in a graph (indicating continuous increase of precipitation with elevation). Seasonal variation of precipitation is also graphically presented for the nine gages. Problems of exposure and measurement techniques in high mountains are discussed. In the second article data on mean monthly snow depth at six points in the Sonnblick area (el. 1600 to 2980 m) are presented for the period 1927–1953 (except 1935–1939). Data for 1949–1953 are also compared with those for 1927–1953. A marked increase in the winter snow cover thickness appears for the 1949–1953 period. Methods of measurement and details of the results are discussed. *Subject Headings:* **1. Precipitation variations 2. Snow cover data 3. Sonnblick, Austria.**—*G.T.*

10M–95 551.577.3(520)

*Toyama, Yasushige, **Precipitation in the basin of Tadami River.** *Journal of Meteorological Research*, Tokyo, 6(7):286–290, Sept. **1954.** 5 figs., 7 refs. In Japanese. **DWB**—The author treats, statistically the annual regime of rainfall, distribution of rainfall and the secular change of annual rainfall for the Tadami River Basin. *Subject Headings:* **1. Rainfall regime 2. Rainfall distribution 3. Annual rainfall variations 4. Tadami River Basin, Japan.**—*H. Arakawa.*

10M–96 551.577.3(51)

Tu, Chang-Wang and Li, Liang-Chi, **Some regional rainfall types of China.** *Academia Sinica. Institute of Meteorology, Memoir*, No. 5, March **1935.** 15+25 p. tables, figs., 10 refs. In Chinese; English translation (p. 25). **DLC**—From the available rainfall records the following ten typical regional groups in China are differentiated. They are: 1) the Gulf of Tongking type, 2) the Nanling type, 3) the Southeastern coast type, 4) the Southern tableland type, 5) Bay of Hangchow type, 6) Lower Yangtze type, 7) Middle Yangtze valley type, 8) North China type, 9) Gulf of Pechihili type and 10) Hainan type. The representative curves of these regional types are drawn from the average of seasonal stations to show the general trend. *Subject Headings:* **1. Regional precipitation types 2. China.**—*H. Arakawa.*

10M–97 551.577.3:523.74(47)

Vitel's, L. A., **Ravnodenstvennyĭ effekt v anomaliiakh osadkov i ego mnogoletnie izmeneniia.** [Equinoctial effect in precipitation anomalies and its long period variation.] *Meteorologiia i Gidro-*

logiia, No. 8:3–6, Aug. **1952.** 2 figs., 6 refs. **DLC**—The author in his work **Annual Variations** **large scale anomalies of precipitation** (in Russian), published in *Meteorologiia i Gidrologiia*, No. 1952, discovered well-expressed annual variations of precipitation anomalies over European Russ The maximum frequency of positive and negative anomalies is observed during spring and autun and the minimum in summer and winter. Investigations of these anomalies were made for t European territory, divided into eleven regions with about 20 meteorological stations in each. Larg scale anomalies were defined as anomalies when the regional amount of precipitation was less th 50% or more than 150% from long period normals. The study showed that precipitation anomal are associated with peculiarities in the seasonal atmospheric circulation and are well-expressed ov the south-eastern part. The northwestern part has no outstanding annual variations. The auth has taken into consideration the works on the relation between solar activity and terrestrial ph nomena, which were published recently by Ol', Rakopova, Eilenson and concluded that the stu of precipitation anomalies confirmed the existence of long range variations of solar corpuscul activity, which influenced the cyclonic and anticyclonic circulation. *Subject Headings:* **1. Precipiti tion anomalies 2. Atmospheric circulation 3. Solar activity 4. European U.S.S.R.**—*N.T.Z.*

10M–98 551.577

Wilson, Walter T., **Discussion of Ray K. Linsley and Max A. Kohler: Variations in storm rainfa over small areas.** *American Geophysical Union, Transactions*, 32(6):932–933, Dec. **1951.** 3 figs Reply by Linsley and Kohler, p. 933. **DLC**—Using the data of Linsley and Kohler the auth examined: 1) the relationship between mean rainfall and range between smallest and largest rainfa amounts and 2) the relationship between storm precipitation for pans of adjacent stations. Th analyses indicate the existence of wide differences of rainfall between adjacent areas even in regio where orographic effects are negligible. *Subject Headings:* **1. Rainstorms 2. Precipitation variation I. Linsley, Ray K. II. Kohler, Max A.**—*I.L.D.*

10M–99 551.577.3(511

Yao, C. S. (*Nanking Univ.*), **The variability of precipitation in Eastern China.** *Acta Meteor logica Sinica*, Peking, 29(4):225–238, Nov. **1958.** 14 figs., 3 tables, 10 refs., 10 eqs. In Chinese English summary p. 237–238. **DLC**—In this paper, the author calculates the average absolut variability (the average absolute deviation) and the average relative variability (the ratio of th average absolute variability to the arithmetic mean in percentage) of precipitation in Eastern China The results calculated are shown in Fig. 1–13. According to the analysis, the following conclusion are drawn: (1) there are low variability centers throughout the year in the North-East and the area around the Tai-hu; (2) high variability center throughout the year in the Taiwan Strait; (3) hig variability center in summer but low center for the rest of the year in the areas south of the Yangtz and north of the Nanling (low centers in North China and SW China in summer); (4) low variabilit center in early autumn in NW China; (5) especially high variability center during the month January to March in the Chengtu Plain. Furthermore, the author computes the latitudinal average of relative variability by interpolation (Table 1). By least squares, the author finds the empirica relations between the annual rainfall and the annual average absolute and annual average relativ variabilities of precipitation. The latter relation is given in the form: $v_r = 22.87 - \frac{17.26}{10^4}\bar{x} - \frac{63.40}{10^7}\bar{x}$ $+ \frac{27.25}{10^{10}}\bar{x}^3$, $\Delta v_r = v_r - \bar{v}_r$, where v_r is the observed variability. Before the calculation of anomalies the goodness of fit has been tested for the empirical formula. For the purpose of calculating the error of precipitation variability, the author derives the calculation formula of the standard error o average relative variability: $\sigma v_r = \frac{v_r\sqrt{0.572 + 1.571 \times 10^{-4}v_r^2}}{\sqrt{N}}$ where N is the number of observations By means of data of Shanghai, the author has also investigated the influence of duration of records on the calculated values of variability, with the result that the calculated values are sufficiently accurate when data of 40 years long are available. *Subject Headings:* **1. Precipitation variability 2. Precipita tion calculations 3. Eastern China.**—*Author's abstract.*

Diurnal Precipitation Variations (551.577.31)

10M–100 551.577.31(54)

*Doraiswamy Iyer, V. and Dass, Ishwar, **Diurnal variation of rainfall at Mahabaleshwar.** *India Meteorological Dept., Scientific Notes*, 9(105):37 42, **1946.** 4 tables. **DWB**—The hourly rainfall records at Mahabaleshwar for the years 1931 to 1940 have been analysed. Tables showing the hourly variation of rainfall and of occasions of rain are given for the twelve months of the year. The data are too few to give a clear inference for the winter months. During the rest of the year the situation of the station on the Western Ghats, which favours the development of convection in the afternoon,

seems to be the chief factor affecting the diurnal variation. *Subject Headings:* **1. Diurnal rainfall variations 2. Rainfall data 3. Mahabaleshwar, India.**—*Authors' abstract.*

10M–101 551.577.31(54)

Doraiswamy Iyer, V. and Zafar, Mohammad, **Diurnal variation of rainfall at Simla.** *India. Meteorological Dept. Scientific Notes*, 9(104):33–36, **1946.** 2 tables. **DWB**—The records of a self-recording raingage at Simla are analyzed for six years between 1919 and 1926. Tables showing the two-hourly variations of rainfall and of occasions of rain are given for the twelve months of the year. The data during the winter months are vitiated by the absence of a heating arrangement to melt the snow as it fell. During the rest of the year there is generally a tendency to a maximum in the afternoon and a minimum in the early part of the night. *Subject Headings:* **1. Diurnal rainfall variations 2. Simla, India.**—*Authors' abstract.*

10M–102 551.577.31(931)

*Maunder, W. J., **Diurnal variation of rainfall in New Zealand.** *New Zealand Geographer*, 13(2):151–160, Oct. **1957.** 6 tables, 2 refs. **DLC, DWB**—Automatic records of rainfall from 16 stations in New Zealand with 5 to 27 years of rainfall used to compute hourly and then 2-hourly averages. Data from 4 representative stations: Ruakura (Hamilton), Kelburn (Wellington), Hokitika and Christchurch are analyzed and presented to show the seasonal and regional variations in time of day (or night) with maximum and minimum rainfall. In most parts the diurnal variation is small but at Hamilton, Wellington, Nelson, Hokitika, Christchurch and Invercargill there is a significant variation during spring and summer. At the southern and western stations the maximum in summer is at night; at the northern stations in the daytime (convective). *Subject Headings:* **1. Diurnal rainfall variations 2. Rainfall variations in New Zealand 3. New Zealand.**—*M.R.*

10M—103 551.577.31(543)

Mulky, G. R. (*Regional Met. Center, Nagpur*), **The diurnal variation of rainfall at Nagpur.** *Indian Journal of Meteorology and Geophysics*, Delhi, 9(4):403–404, Oct. **1958.** 3 figs. **DWB, DLC**—The daily variation of rainfall at Nagpur (lat. 21°07′N, long. 79°07′E) is shown in curves of hourly totals during the monsoon months (June–Sept.), as well as during the non-monsoon (Oct.–May) season. *Subject Headings:* **1. Diurnal rainfall variations 2. Nagpur, India.**—*N.N.*

10M–104 551.577.31(441,442)

*Péguy, Ch.-P. and Chapin, Melle G. (*both, France*), **Intensité et covariométrie des précipitations journalières dans l'ouest de la France.** [Intensity and covariance of daily rainfall in the west of France.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 3–14, 1957*, [*Transactions*], 1:507–514, pub. **1958.** fig., 6 tables. **DWB**—A systematic study of the intensity of daily precipitation in W France has been made for 20 years. But from 1931–1934 much of the study was concerned with establishing an index of precipitation distribution and the covariance of rainfall in the area. Detailed results from two stations are included in this report. These are compared with the existing conditions in Southern France. The study at these two stations indicates two numerical coefficients of 0.48 and 0.54 during the summer. Results for other seasons are evaluated. *Subject Headings:* **1. Diurnal precipitation variations 2. Covariance analysis 3. Western France.**—*N.N.*

10M–105 551.577.31(71)

Thomas, M. K., **Diurnal variations of precipitation frequency in Canada.** *I.U.G.G. Association of Meteorology, Brussels*, **1951**, *Procès-Verbaux des séances, Mémoires et Discussions*, pub. **1953.** p. 185. **DWB**—Short notes on time of precipitation maxima and minima for six stations. *Subject Headings:* **1. Diurnal precipitation variations 2. Canada.**—*A.A.*

10M–106 551.577.36(560) 551.577.31(560)

Tümertekin, Erol (*Geographical Inst., Univ. of Istanbul*) and Cötürk, Hüseyin (*General Directorate of Highways*), **Maximum daily rainfall in Turkey.** *Istanbul. Üniversité. Coğrafy Enstitüt Review* (*International Edition*). No. 4, **1958.** 49 p. 4 figs., table, 5 foot-refs. Abstracted from reprint. **DWB** (M77.31 T925ma)—An analysis of the maximum daily rainfall in Turkey has been made and the figures for individual observation station are tabulated according to the geographical distribution of the mean maximum daily rainfall. The frequency of the mean value is 2.33 years. The daily maxima of 30 to 40 mm are shown on a map. Maximum values occur in the coastal areas, particularly in the Antalya and Rize regions; the smallest, near Tuz Golu (Salt Lake). *Subject Headings:* **1. Maximum rainfall 2. Diurnal rainfall variations 3. Turkey.**—*N.N.*

Annual Precipitation Variations (551.577.32)

10M–107 551.577.32(77

Eichmeier, Albert Henry; Wheaton, R. Z. and Kidder, E. H., **Variation in summertime rainfa in South-Central Michigan.** *Michigan. Agricultural Experiment Station, East Lansing, Quarter Bulletin*, 41(4):886–888, May **1959.** 4 figs. **DLC**—From a study of 16 recording rain gages 1956–57 and 22 recording gages in 1958 installed on Sloan and Deer Creek watersheds of Michiga the distribution of rainfall, thunderstorms and precipitation periods were established. There wa a wide variation in summer rainfall. This emphasizes the importance to farmers of having rain gag on their farms in order to know how much precipitation has been received. *Subject Heading* **1. Seasonal precipitation variations 2. Michigan.**—*N.N.*

10M–108 551.577.32(67):519.2

Griffiths, J. F. (*East Africa Meteor. Dept. Nairobi, Kenya*), **The variability of annual rainfall i East Africa.** *American Meteorological Society, Bulletin*, 40(7):361–362, July **1959.** fig., 2 refs., eq **DWB, DLC**—A short paper delimiting the areas in East Africa in which the annual rainfall is variabl The paper, first, works out mathematically a standard pattern for judging variability values for thi region through an analysis of 298 long-period East African station records. Then it deduces th resultant extreme areas. The resulting isonomals are graphically shown. *Subject Heading* **1. Annual rainfall variations 2. Statistical analysis of rainfall 3. East Africa.**—*I.S.*

10M–109 551.577.32(64

Isnard, H., **La répartition saisonnière des pluies au Maroc.** [Seasonal distribution of rain i Morocco.] *Annales de Géographie, Paris*, 67(359):39–42, Jan.–Feb. **1958.** 4 figs., 2 refs.—Th analysis of the annual variation of precipitation in some fifty Moroccan stations showed two differen regimes: a maritime one with preponderant rains during autumn and winter, and the other continenta with a high percentage of rains during spring and summer. The maritime type with scanty spring summer rains, not exceeding 30% of the annual amount, is peculiar to all the stations situated i the Moroccan Atlantic front. The continental type embracing a large area, including the interior o the Atlas Mountains and eastern Morocco, where more than 40% of rains occur in the course o spring and summer. *Subject Headings:* **1. Seasonal rainfall distribution 2. Rainfall 3. Morocco** —*A.V.*

10M–110 551.577.32:551.58

Ivanov, N. N., **Raspredelenie dvoĭnogo godovogo maksimuma osadkov na zemnom share** [The distribution of the double annual maximum of precipitation on earth.] *Vsesoiuznyĭ Geogra ficheskiĭ S"ezd, 2nd, Leningrad, 1947, Trudy*, 2:194–200, **1948. DLC**—Although there is no reason to refute completely the generally adopted explanation of the causes of origin and distribution of the double annual precipitation maxima—by the fact that the sun appears twice at the zenith (in March and Sept.) over the equatorial zone, and the amount of precipitation increases during these periods, forming two rainy periods in one year—the author shows on the ground of analyses of numerical and climatological data that the above mentioned distribution of the double maximum is far from being encountered everywhere in the equatorial zone, and that there are many regions in the temperate and Arctic zones where the phenomenon takes place, but cannot be explained by the zenith position of the sun. The author explains the latter phenomenon (double maximum in temperate zones) by the passing of a climatological front over a given temperate territory twice a year. Such regions are most often located where zones of contrary types of annual precipitation regime connect as in middle Spain, north Italy, middle Greece, Asia Minor. After having established the methods of a quantitative expression of the precipitation amplitude (in percent of its annual amount) and of the degree of manifestation of the secondary maximum the author reviews, on basis of precipitation data for 2300 points of the globe (including 220 points in the equatorial zone), the main regions of double precipitation maxima and shows that while the secondary amplitude is about 4% in the equatorial zone it often reaches 8% and over in moderate latitudes. *Subject Headings:* **1. Annual rainfall variations 2. Solar climate.**—*A.M.P.*

10M–111 551.577.32(522.7)

Kamijo, K. and Eta, S., **Bai-u (rainy season) at Kagoshima, Japan.** *Journal of Meteorological Research*, Tokyo, 9(8):607–608, Aug. **1957.** 3 tables. In Japanese. **DWB**—The dates, duration, and amount of Bai-u rainfall at Kagoshima from 1911–1955 are tabulated. The statistical analysis shows that, on the average, Bai-u starts June 2nd and ends July 19th, giving a rainfall of 786.3 mm. The Bai-u period ranges from 22–80 days, the amount of rainfall ranges from 210.5–1884.5 mm, and the interval interruption of rainfall during the Bai-u season ranges from 5–20 days. *Subject Headings:* **1. Bai-u 2. Kagoshima, Japan.**—*J. H. Woo.*

10M–112 551.577.32(51)

*Kao, Yu-hsie and Kuo, Chi-yün (*Inst. Geophys. and Met., Academia Sinica*), **On the autumn raining area in China.** *Acta Meteorologica Sinica*, Peking, 29(4):264–273, Nov. **1958.** 9 figs., 2 tables, 9 refs. In Chinese; English summary p. 273. **DLC**—In Sept. or Oct. there are several regions in China in which both rainfall and rainy days are greater than during the preceding and following months. Such regions are called autumn rainy areas, and are located principally in western China and the Yantze Delta. It is found that the beginning and ending dates of autumn rainy periods are closely related to the advance of the jet stream over Southern Asia. The retreat of the Indian summer monsoon is also found to correspond with the end of the autumn rainy period in China. *Subject Headings:* **1. Rain days 2. Autumn rainfall 3. China.**—*Authors' abstract.*

10M–113 551.577.32(52)

Kuribayashi, N., **On the Bai-u at Naze.** *Journal of Meteorological Research*, Tokyo, 9(8): 605–606, Aug. **1957.** 2 figs., 2 tables. **DWB**—Bai-u Naze area starts abnormally around mid-June before the Bai-u front moves in completely. The average dates of the beginning and end of the Bai-u season are May 8 and June 28, as indicated by studies of precipitation data, duration of solar radiation, and weather charts from 1914–1953. The analysis indicates that the Bai-u front forms around late May. Bai-u rainfall can be predicted from the rainfall of the May–June period. The periodogram analysis of Bai-u from 1914–1953 indicates that 10 and 13 years cycles are prevailing. *Subjcet Headings:* **1. Bai-u 2. Naze, Japan.**—*J. H. Woo.*

10M–114 551.577.32:551.553.21(57)

Nikol'skaia, V. V. (*Inst. Geog., Acad. Sci. USSR., Moscow*), **Dal'nevostochnyĭ musson.** [The far Eastern monsoon.] *Priroda*, Moscow, No. 7:125–126, July **1956. DWB, DLC**—A very hot and damp type of weather prevails in July in the southern part of the Soviet Far East, which is associated with the summer monsoon of moderate latitudes. The author describes the type of rain it brings, and the effects of cloudbursts and lasting rains on mountain streams and rivers (floods and high waters damaging hay and grain crops, and interfering with the harvest and land cultivation). Monsoon floods have a favorable effect only upon fresh water fish as they extend the areas of their habitat. Sometimes the ill effect of summer monsoons is alleviated by the intrusion of hot dry air masses from Mongolia and North China. *Subject Headings:* **1. Summer monsoons 2. Monsoon floods 3. Monsoon rainfall 4. Soviet Far East.**—*A.M.P.*

10M–115 551.577.32(52):551.509.317

Ohtaki, T., **On the last stage of Bai-u season in Japan.** *Journal of Meteorological Research*, Tokyo, 7(4):206–212, June **1955.** 9 figs., 7 refs. In Japanese; English summary p. 206. **DWB**—In recent aerological studies of upper air flow over Japan during the last stage of the Bai-u season, T. Murakami (1952) drew attention to the fact that a cut-off low appearing near Japan in this season plays the principal role in the ending of the Bai-u season. In this paper the author clarifies the fact that the appearance of the cut-off cannot be a sufficient condition for the ending of Bai-u, but the ending occurs when a quasi-stationary long wave trough situated between long. 120°E and 130°E begins to propagate eastward under the effect of either the gradual northward displacement of the jet stream over Japan, associated with the establishment of the stage of index cycle (after H. Riehl) from N I to N II, or the cut-off low already pointed out by T. Murakami from S I to S II. *Subject Headings:* **1. Bai-u 2. Upper air analysis 3. Japan.**—*Author's abstract.*

10M–116 551.577.32(671)

§Pflugbeil, W., **Das Versagen der tropischen Regen in Nieder-Guinea im Frühjahr 1958.** [The failure of tropical rain to occur in lower Guinea in the spring of 1958.] *Wetterlotse*, Hamburg, No. 135:195–200, Sept. **1958.** 4 figs., table. **DWB**—Long period mean values of precipitation for Mayumba at the coast of Lower-Guinea, West Africa, are tabulated and featured isometrically for comparison with those of early 1958. Normally, the peaks of precipitation occur in March (378 mm) and Nov. (260 mm), followed by the dry June–Sept. period. The unusual departure in Jan. (150 mm), Feb. (10 mm) and March (60 mm), 1958, is shown to be regional rather than local. *Subject Headings:* **1. Seasonal precipitation variations 2. Tropical rainfall 3. Lower Guinea, West Africa.**—*W.N.*

10M–117 551.577.32:551.553.21(540)

Rama Rau, Santha, **The wind that means life to India.** *New York Times Magazine*, Section 6, June 8, **1952.** p. 12, 24, 26–27. 2 photos. **DLC**—A vivid, illustrated account of the cause and characteristics of the Indian monsoon. Because it has failed to bring enough rain for several years in some parts of Madras State, the Government of India has hired water diviners who work on the ground or even in airplanes; Point Four technicians also are trying to solve the water problem.

Many believe that cutting forests or vibration from airplanes can spoil the natural monsoon regime. *Subject Headings:* **1. Monsoon rains 2. India.**—*M.R.*

10M–118 525.5:551.577.32(672) 551.581(213

Sillans, Roger, **A propos de la conception classique du processus saisonnier du régime climatique subéquatorial.** [On the classical concept of the variation of seasons in tropical climate.] *Académie des Sciences, Paris, Comptes Rendus*, 240(7):802–803, Feb. 14, **1955.** 4 refs. **DWB**—This note is directed against the widely adopted belief that there are four seasons (a long and a short dry, and a long and a short wet season), in equatorial climates. According to the author's observations (confirmed by other authorities) made in the Ubangi-Shari territory, French Equatorial Africa, there are only two seasons, a dry and a wet one, this latter consisting of three periods, e.g. one period of intense rainfall preceded and followed by periods of medium rainfall intensity. *Subject Headings:* **1. Seasons 2. Rainy seasons 3. Tropical climates 4. Ubangi-Shari, French Equatorial Africa.**—*G.T.*

10M–119 551.577.32(498

Stoenescu, St. M., **Citeva caracteristici ale regimului precipitatiilor in R. P. R.** [Some characteristics of the precipitation regime in Romania.] *Meteorologia Hidrologia şi Gospodarirea Apelor*, Bucharest, 3(2/3):29–33, **1958.** 4 figs., table. English summary p. 137. **DWB**—The quantitative distribution of precipitation during the warm (April Sept.) and other seasons is presented in percentages of the annual sum, using the data of a 55-years observation period (1896–1915, and 1921–1955). The types of precipitation regime in the different regions of Romania are analyzed according to the Angot indice $K = q \cdot 365/Q_n$, (q being the monthly precipitation total of a given month and the number of days of that month and Q the annual total). *Subject Headings:* **1. Annual precipitation variations 2. Precipitation regime 3. Romania.**—*Author's abstract.*

10M–120 551.577.32(485)

Wallén, C. C. (*Swedish Met. & Hydr. Inst., Stockholm*), **Variability of annual precipitation in Sweden.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 9(2):113–123, **1958.** 5 figs., table, 9 refs., eqs. English, German and French summaries p. 113–114. **DWB, DLC**—Different measures of variability of precipitation are discussed and it is concluded that it is preferable to apply the relative intersequential variability in cases when overall trends are feared in the records. 127 stations in Sweden have been studied for the period 1901–1950 as to the relative interannual variability of precipitation. For a selection of these stations other measures have also been calculated and a comparison has been made between the coefficient of variation and the intersequential variability. As the relation between these measures varies with the existence of serial correlations in the records the serial correlation coefficient for a lag of one element has been calculated. The value of the coefficient has indicated the existence of trends in certain areas of Sweden generally in agreement with earlier investigations by Ångstrom. The geographical distribution of the relative interannual variability in Sweden is discussed and also the distribution of anomalies of relative variability compared with the world's normal curve completed by Conrad. It is shown that the relationship between relative variability and precipitation amount for Swedish stations can be expressed by a hyperbolic function deviating from Conrad's world normal curve only by an aditive constant. *Subject Headings:* **1. Annual precipitation variations 2. Precipitation trends 3. Sweden.**—*Author's abstract.*

10M–121 551.577.32:551.513.1(52)

Yasui, H.; Shimakawa, K.; Morino, U. and Yamada, T., **Blocking activity and Bai-u phenomenon in the Far East.** *Journal of Meteorological Research*, Tokyo, 7(4):213–222, June **1955.** 20 figs., 3 refs. In Japanese; English summary p. 213. **DWB**—The authors investigated the relation between the Bai-u season and blocking activity near Japan using the Daily Series Synoptic Weather Map (1949–1951) published by the U. S. Weather Bureau. The results show that: 1) the blocking near Japan prevails mostly from the middle of May to the beginning of June, and disappears together with the ending of the Bai-u season; 2) basic zonal westerly flow splits into two separate branches at 110°E, in other words the location where blocking initiates is apt to occur at this longitude; 3) a warm high center is situated near the Okhotsk Sea during the Bai-u season in years when blocking occurs frequently, its movement being very slow, while the motion of the cut-off cyclone is comparatively rapid; 4) the rainfall area moves southward in the Bai-u season with strong blocking, while it moves slightly northward and becomes a narrow band in the year of strong zonal flow aloft. *Subject Headings:* **1. Blocking action 2. Bai-u 3. Japan.**—*Authors' abstract.*

Other Precipitation Periodicities (551.577.33)

10M–122 551.577.33:517.512.2(540)

Dewey, Edward, **Cycles in weather: rainfall in the United Provinces, India: the 9 2/3 year rhythm in the Rihand and Sone River watersheds, 1903–1947.** *Foundation for the Study of Cycles,*

Riverside, Conn., Foundation Report No. 10, **1950.** 19 p. 8 figs., 2 tables, refs., eq. **NNA, DWB** (M83.13 D519cy)—Cyclical trends in the fluctuation of rainfall in these regions are noted and possibilities of parallel cycles in other climatic as well as biological phenomena are suggested. *Subject Headings:* **1. Rainfall cycles 2. Periodicities 3. India.**—*H. P. Kramer.*

10M—123 551.577.33:551.579.5:517.512.2(45)

Mosetti, Ferruccio and De Feo, Antonio, **Studi sui ritmi di piovosità in Puglia e relative applicazioni.** [Study of the rhythms of rainfall in Apulia and its applications.] *Bari (City). Università. Istituto di Geodesia e Geofisica, Publicazione,* No. 5. 12 p. 8 figs., 5 refs. Italian, German, English and French summaries p. 3. **DWB** (M(055)B252pu). Reprinted from *Tecnica Italiana,* Trieste, No. 4, June **1958. DLC**—A periodogram analysis of rainfall at 60 stations in Apulia (1921–1957) reveals periodicities of 2.1, 3, 4.3, 6, 8.5, 12, 17, 24, 34, 48, 68 and 96 months (forming a geometric progression having a factor of $\sqrt{2}$). An attempt is also made to correlate precipitation variations with fluctuations of ground water level. *Subject Headings:* **1. Rainfall periodicities 2. Ground water-precipitation relationships 3. Periodogram analysis 4. Italy.**—*G.T.*

10M–124 551.577.33(675)

Pire, J. (*Chef du Bureau de Statistiques et de Climatologie du Service Météorologique du Congo Belge*), **La petite saison sèche à Léopoldville.** [The small dry season at Leopoldville.] (In: Angola. Serviço Meteorológico, **Miscelanea geofisica.** Luanda, **1956.** p. 174–183. fig., table. **DWB** (M(08) A592mi)—About the middle of the rainy season a definite decrease of average daily rainfall and of average number of rainy days takes place at Léopoldville. Characteristics of this "small dry season" are studied objectively by means of statistical tests. The average daily amount is found to be well over 2 mm during that period, although it is considerably below the average of the rainy season. The dry period starts fairly regularly during the last days of December and usually lasts five weeks; quite frequently it is followed by a second period of the same type starting about twelve days after the end of the first, and lasting about two weeks. *Subject Headings:* **1. Seasonal precipitation variations 2. Dry season 3. Rainy seasons 4. Léopoldville, Belgian Congo.**—*Transl. of author's abstract.*

10M–125 551.577.33(43)(47)

Rosík, Bohumil (*Brno Agricultural College*), **Zpracování deštővrch krivek periodicity v SSSR a v Německu.** [Plotting precipitation periodicity curves in the U.S.S.R. and in Germany.] *Meteorologické Zprávy,* Prague, 9(3):67–69, June **1956.** 2 tables, 13 refs., 13 eqs. **DWB**—Formulas for calculating maximum precipitation intensity for specified periods of expectancy are discussed. Design precipitation intensity values determined for various regions in Germany and the U.S.S.R. are tabulated. Such design values are extremely useful in all types of hydrological planning. Czechoslovakia should follow the example of Germany and the U.S.S.R. in establishing these precipitation expectancy values for the whole country on a uniform basis. *Subject Headings:* **1. Precipitation periodicities 2. Precipitation intensity 3. Germany 4. U.S.S.R.**—*G.T.*

10M–126 551.577.33:65(73)

Wheeler, Raymond H., **The seven-year rainfall cycle in the U. S. in relation to business trends.** *Journal of Human Ecology,* 1(3), **1951.** 3 p. fig. **DWB**—A seven-year rainfall "cycle" is shown to be associated with the "boom and bust" cycle of business in the United States. The rainfall peaks correspond to the booms, and the troughs in the rainfall cycle to the busts. The theory is advanced that the wet years stimulate human aggressiveness and hence good business, while the dry years have the opposite effect. Variations in rainfall even in the peak years, various conflicting rainfall cycles and irregularities in the rhythm of business conditions are recognized but discounted. *Subject Headings:* **1. Rainfall cycles 2. Economic cycles 3. United States.**—*M.R.*

10M–127 551.577.33:65 551.524.33:65

Wheeler, Raymond H., **The 9-year cycle in common stock prices in relation to the weather trends.** *Journal of Human Ecology,* 1(4), **1961.** 9 p. fig., table, 7 refs. **DWB**—In a previous paper the author correlates the peaks and troughs of business conditions in the United States with the so called "7-year rainfall cycle." In this paper the same methods are used to show that a *9-year* rhythm in rainfall and temperature conditions corresponds with a 9-year cycle in the stock market and related prices. A lot of smoothing and adjusting and neglecting is done, and the same conclusion reached as in the 7-year cycle study—that the dry, hot years are debilitating and the cool wet years energizing. The 100-year cycle is also invoked. *Subject Headings:* **1. Rainfall cycles 2. Temperature cycles 3. Economic cycles 4. United States.**—*M.R.*

Secular Precipitation Trends (551.577.34)

10M–128 551.509.33 551.577.34:551.583.14(74)

Hendrick, Robert L. (*Travelers Weather Research Center, Hartford, Conn.*), **Weather cycles and rainfall.** *New England Water Works Association, Journal*, 73(3):267–274, Sept. **1959. DWB, DLC**—Difficulties in long-range weather forecasting and achievements to date are discussed. Records for Boston dating back to 1818 have not proved of value for successful long-range weather forecast. Out of a series of investigations and data collected on rainfall cycles and trends in New England, only one prediction on hurricane winds and rains has been reasonable: that these winds and rains will be less frequent in the decades ahead. The author suggests that meteorologists and others contribute their skill in interpreting past weather data for a long-range prediction to help solve water supply problems. *Subject Headings:* **1. Rainfall trends 2. Weather cycles 3. Long range forecasting.**—*N.N.*

10M–129 551.577.34(552.1)

Kojima, T., **On the secular variation of annual precipitation at Fukuoka.** *Journal of Meteorological Research*, Tokyo, 10(8):705–707, Aug. **1958.** 4 figs., 2 tables, eqs. In Japanese. **DLC**—A study of annual precipitation variations at Fukuoka, 1907–1955, shows three significant periods: 1907–1923 with high rainfall, 1924–1944 with low rainfall and 1945–1955 with high rainfall. Seasonal precipitation variations are also analyzed. *Subject Headings:* **1. Annual precipitation variations 2. Seasonal precipitation variations 3. Secular trends in precipitation 4. Fukuoka, Japan.**—*K.C.*

10M–130 551.577.34(437.1)

Křivský, L., **Representativnost srážek Prahy-Klementina pro Čechy.** [Representativeness of precipitation at Prague-Klementinum for Bohemia.] *Meteorologické Zprávy*, Prague, 11(3):70–74, **1958.** 2 figs., table, 10 refs. Russian and German summaries p. 70–71. **DWB**—Annual precipitation amounts for Prague show a good correlation with those for Bohemia during the period 1876–1957. For the period 1876–1909 the correlation coefficient is 0.749. A curve of secular variations of precipitation in Bohemia is also constructed by means of the method of double integral of deviations. The maximum of this curve is at the end of the 19th century, its minimum from 1925 to the present. *Subject Headings:* **1. Regional-local precipitation correlations 2. Secular precipitation variations 3. Bohemia, Czechoslovakia.**—*G.T.*

10M–131 519.24:551.577.34

†*Pollak, Leo. Wenzel (*Dublin*), **On the systematic influence in series of annual rainfall totals.** *Eire. Meteorological Service, Geophysical Publication*, 3(5), **1951.** 35 p. tables, 7 figs. (1 fold), eqs., bibliog. p. 23–26. Price: 18 sh. **DWB**—Various criteria used to distinguish between purely random data and those subject to systematic influence and mutually dependent are reviewed. Those discussed are Cornu's constant mean variability, Goutereau's constant or ratio, Helmert's criterion, the criteria of iteration, runs and maxima and minima, Abbe's criterion, Conrad's modified criterion for smoothed series, Abbe-Helmert's improved criterion measurer of significance for systematic influence and variance criteria. The criteria of Helmert-Abbe and of Goutereau are applied to 127 long period records of annual rainfall totals for 119 stations distributed over the globe for testing the existence of systematic influence. "The results suggest that there is a certain persistence in annual rainfall totals of successive years at some places." If the ratio of difference between the actual and expected value of the criterion to its standard error" is introduced as an index of systematic influence "and we assume that an index larger than 3 is significant the following nine places exhibit systematic influence: Cape Town, Freetown, Moulmein, Boston, Charleston, Hatteras, Portland and Thorshavn. At nine more places the indices exceeded two, but do not reach three." The indices derived by Helmert's test are represented on a world map. *Subject Headings:* **1. Rainfall persistence 2. Statistical studies.**—*I.L.D.*

10M–132 551.577.34:551.515.73(931)

de Lisle, J. K., **Secular variations of West Coast rainfall in New Zealand and their relation to circulation changes.** *New Zealand Journal of Science and Technology, Sec. B*, 37(6):700–715, May **1956.** 5 figs., 8 tables, 9 refs. **DLC.** Also issued as: *New Zealand. Meteorological Service, Meteorological Office Note*, No. 42, **1956.**—Six series of rainfall observations from the west coast of the South Island of New Zealand were found to give no evidence of long period (*c.* 60 years) secular trends in seasonal rainfall. Significant shorter period changes in spring (a general decrease from about 1912) were found and some significant variations in winter and summer, but none in autumn. Except in autumn, rainfall variations were found to depend on variations in the lower level westerly winds and the spring variations implied a general polewards displacement of the spring position of the subtropical anticyclone tracks over the last 40 years. Indications of an increase in southerly wind in summer since about 1930 have also been found. *Subject Headings:* **1. Secular rainfall variations 2. Anticyclone tracks 3. New Zealand.**—*Author's abstract.*

Precipitation Frequencies (551.577.36)

10M–133 551.577.36:519.24(54)

*Bose, N. K. (*Dir., River Research Institute, West Bengal*) and Mag, S. K. (*Damodar Valley Corporation, West Bengal*), **Annual rainfalls of Damodar, Mayurakshi and Sone Catchments and the rainfall characteristics of the Damodar Catchment.** *I.U.G.G. International Association of Scientific Hydrology, Brussels,* **1951,** [*Transactions*], v. 3:59–74, **1952.** 14 tables, graphs, 4 refs. **DWB**—Statistical analysis of annual rainfall over some catchment areas in India for the period 1891–1948, giving data for each year and discussing sequences of dry years. Furthermore, the duration of rain spells and the frequency of daily precipitation is studied, applying Slades' frequency curve. *Subject Headings:* **1. Precipitation frequencies 2. Statistical studies 3. Catchment basins 4. Bengal, India 5. Damodar catchment, India.**—*A.A.*

10M–134 551.577.36(678.2)

*Brazell, J. H., **Rainfall at Tabora, Tanganyika.** *East Africa High Commission. Meteorological Dept., Memoirs,* 2(12), **1958.** 4 p. 4 figs., 8 tables, ref. **DWB** (M(055) B862m)—Rainfall records at Tabora, Tanganyika from 1894–1912, 1922–1930, and 1931–1956 are analyzed to show monthly, seasonal and annual averages, year to year variations, frequencies, standard deviations, 5-day rainfall, daily frequencies, intensities (1931–54), duration, maximum intensities, etc. Duration frequencies, averages and extremes of 5-day rainfall are shown by histograms. *Subject Headings:* **1. Rainfall frequency analysis 2. Tabora, Tanganyika.**—*M.R.*

10M–135 551.577.36(611) 551.524.3(611) 551.579

*Cavalloni, H., **Débits et crues de l'Oued Zeroud à Sidi Saad, Poste SO.20, période 1949–1954.** [Discharge and floods of the Oued Zeroud at Sidi Saad, Post SO.20, 1949–1954.] *Tunis. Bureau de l'Inventaire des Ressources Hydrauliques, Recueil des Observations Hydrométriques 1953/1954,* Part 3, [pub. **1955?**]. 16 p. figs., numerous tables, 4 refs. **DWB**—Monthly temperature and precipitation data are given for Thala, Kairouan and Gafsa for periods 1901–50, 1949–54, and frequencies for 1901–45 for each month for groups from 0–5, 10, 20, 30, 50, 100, 200, 300, 400–600 mm for both monthly and daily amounts. Runoff data also given. *Subject Headings:* **1. Precipitation frequencies 2. Temperature data 3. Runoff data 4. Tunisia.**—*M.R.*

10M–136 551.577.36(64)

*Debrach, J.; Ousset, J. and Michel, M., **Précipitations atmosphériques au Maroc.** [Atmospheric precipitations in Morocco.] *Rabat, Morocco. Institut Scientifique Chérifien, Service de Physique du Globe et de Météorologie, Annales,* 16:77–108, **1956.** tables, charts, 7 refs. **DLC**—Data relating to the frequency of precipitation in Morocco during the period 1925–1949. These data are a continuation of the statistics of mean values of precipitations at 228 stations during the same period, published in the preceding volume of the *Annales.* The mean values of the number of days during which precipitation was recorded are given month by month for 61 stations, and the annual total is given for 125 stations. Charts give the monthly and yearly distribution of the mean number of days with precipitation and also the annual monthly distribution of the total amount of precipitation. The annual variation of frequencies generally presents 2 maxima: one in spring, and the other in autumn. The annual number of rainy days does not exceed 100; maxima appear in the western part of the Rif (60 to 70 days) and in the Middle Atlas (60 to 90 days). The mean intensity of precipitation (mean quantity of rain for each rainy day) is discussed. The ratio $R = P/N$ of the annual total P of yearly (or monthly) precipitation to the number N of annual (or monthly) rainy days is calculated. This mean diurnal intensity, computed for one year, fluctuates between 3 and 12 mm and the mean intensity for one day corresponding to a determined month exceeds 15 mm in exceptional cases only. *Subject Headings:* **1. Precipitation frequencies 2. Precipitation intensity 3. Morocco.**—*A.V.*

10M–137 551.577.36:519.24

Doi, K. (*Fukuoka District Met. Obs.*), **Persistence of rainfall.** *Geophysical Magazine,* Tokyo, 29(3):307–332, Aug. **1959.** 5 figs., 4 tables, 5 refs., eqs. English summary p. 307. **DWB, DLC**—The frequency distribution of rainfall takes generally quite a different form depending on the length of the observation period. It seems, however, that the parameters associated with each of these different frequency curves are not independent of each other. In this report, the relations existing between them are examined theoretically. The analysis is based essentially on the concept of *persistence,* where Polya-Eggenberger's distribution function is conveniently assumed as a basic frequency curve. As an application of the theory, a simple method of estimating statistical features of hourly rainfall from the daily materials is suggested. Applications to climatology, such as to rainy or dry periods are also considered. *Suject Headings:* **1. Rainfall frequency distribution 2. Rainfall persistence.**—*Author's abstract.*

10M–138 551.577.36(759

Fafrer, L. A., **Design rainfall. Central and Southern Florida project.** *American Society o Civil Engineers, Proceedings*, Vol. 80, Separate, No. 519, Oct. **1954.** 14 p. 4 tables, 8 figs. **DWB—** The economic and design analyses of many sections of the Central and Southern Florida Projec will be based on frequency studies. This paper describes the study which was made in order t determine the probability of the future occurrence of rainfall of various amounts and duration in central and southern Florida. *Subject Headings:* **1. Design rainfall 2. Rainfall frequencies 3. Florida.**—*Author's abstract.*

10M–139 551.577.32:519.24(746

†Friedman, Don G. and Janes, Byron E., **Estimation of rainfall probabilities.** *Connecticut Agricultural Experiment Station, Storrs, Bulletin*, No. 332, Dec. **1957.** 22 p. 6 figs., 3 tables, 8 refs. 9 eq. **DWB** (M77.36 C752es)—Cumulative probability methods are described and illustrated for temperature accumulations and applied to weekly, monthly or seasonal precipitation probabilities for Connecticut stations using 30-year records, sampling fluctuations, empirical and mathematical models and their characteristics and confidence estimates. The incomplete gamma distribution is used to smooth random irregularities in the curves and from comparison of the differences in curves of varying periods or at various places. An example for Storrs, Conn., is given in tables. *Subject Headings:* **1. Rainfall probability estimates 2. Incomplete Gamma distribution 3. Storrs, Conn.** —*M.R.*

10M–140 551.577.36(548.4) 551.577:551.501.9

*Hariharan, P. S. (*Regional Met. Centre, Bombay*), **A study in spacial and frequency distribution of daily rainfall in relation to network of rain recording stations.** *Indian Journal of Meteorology and Geophysics*, 7(3):285–288, July **1956.** fig., 5 tables, 2 refs. **DWB**—A study of the frequency of rainfall of certain areal extent and certain intensity categories was made for South Hyderabad, using the 6 regular synoptic reporting stations for one estimate, and these and 23 other rainfall stations in the area as a check sampling network. The data are for the monsoon season (June–Sept.) of 3 years (1941–3) and comprise 366 days of record. It was found that the sparser network (6 stations) makes the rain seem more widespread when it is over $>50\%$ of the area, and less widespread when it is over $<50\%$ of the area, and seem less intense when rain is light and more intense over a greater number of stations when heavy, than does the fuller network. *Subject Headings:* **1. Rainfall network density 2. Rainfall frequency distribution 3. S. Hyderabad, India.**—*M.R.*

10M–141 551.577.36(773)

*Huff, F. A. and Neill, J. C., **Frequency of point and areal mean rainfall rates.** *American Geophysical Union, Transactions*, 37(6):679–681, Dec. **1956.** 2 figs., 4 tables, 4 refs. **DWB, DLC**—Use of special recording raingages enabled recording of one-minute rainfall amounts for a 50-gage network on a 100-sq mi area in central Illinois during the 1952–53 thunderstorm seasons. One-minute amounts from 19 storms during this period have been used to study the frequency of rainfall rates in shower-type storms under warm season conditions, on both a point-rainfall and areal-mean-rainfall basis. Within the 100-sq mi area, smaller areas of 10, 25, and 50 sq mi were used to obtain an indication of the effect of changing area on the distribution of areal mean rates. The expected tendency for the mean rate to decrease with increasing area was found. For example, the median rate for all 19 storms combined ranged from 1.45 in./hr for point rainfall to 0.96 in./hr for the 25-sq mi area to 0.66 in./hr for the 100-sq mi basin. The degree to which averaging suppresses details of high rates, as well as the general effects of the averaging process on the distribution curve, was also studied by comparing the distribution of point rates when the rates were based on 1-, 5-, 10-, 15-, and 30-minute averages. Results showed the maximum observed rate ranging from 13.80 in./hr for one-minute to 2.45 in./hr when based on a 30-minute average. Similarly, when all 19 storms were combined, the median rate ranged from 1.45 in./hr for one-minute averages to 0.56 in./hr for 30-minute averages. *Subject Headings:* **1. Areal mean rainfall 2. Rainfall frequency distribution 3. Rainfall intensity distribution 4. Central Illinois.**—*Authors' abstract.*

10M–142 551.577.36(52)

Izawa, T., **On the distribution of precipitation (1st paper).** *Journal of Meteorological Research*, Tokyo, 5(5):393–399, June **1953.** 6 figs., table, 7 refs. In Japanese; English summary p. 393. **DWB**—The distribution of cumulative precipitation such as daily, ten-day and monthly precipitation is theoretically given as a function of time, by "transition probability" of precipitation, considering the amounts as discontinuous variables with some unit value. The oretical distribution of precipitation is compared with observed relative frequency distribution with unit value of 10 mm at Sapporo, obtained from data of warm season from May to Sept. during 63 years, with good agreement between theoretical and observed values. The relative transition probability of precipitation is also

obtained and compared with transition probability at Sapporo, Obihiro and Kushiro. *Subject Headings:* **1. Cumulative precipitation 2. Japan.**—*From author's abstract.*

10M–143 551.577.36:551.515.8(525.7)

Onodera, A., **On the precipitation accompanied with the cold front passing by Kushiro.** *Journal of Meteorological Research*, Tokyo, 5(3):173–178, March **1953.** 5 figs., 11 tables. In Japanese; English summary p. 173. **DWB**—Among the cold fronts passing over Kushiro 43% give rise to precipitation. In this paper the probability of precipitation was investigated in 183 cases during the last 5 years. The results obtained are as follows: 1) the probability is maximum in summer and minimum in winter; 2) it is not connected with the vapor content of the air mass preceding the cold fronts, except in Oct.; 3) it appears that the probability of precipitation increases when the distance of the cyclone center is greater than 10 degrees in latitude. A diagram featuring the distance from cyclone center *vs* the central pressure was found to be useful for estimating the probability of precipitation. *Subject Headings:* **1. Cold fronts 2. Precipitation forecasting 3. Objective forecasting 4. Precipitation probability.**—*Author's abstract.*

10M–144 551.577.36(54)

Panchang, G. M., **Use of frequency method for estimating rainfall intensities of rare occurrence with special reference to data of the Tapti Basin.** *Irrigation and Power*, Simla, 9(2):312–320, April **1952.** 5 figs., 4 tables, foot-refs. **DWB**—Study based on precipitation data on the Tapti Basin, located near Bombay, for the period 1903–42. Frequency distribution of annual rainfall for single stations can be described by Pearson's distribution law, type 5, but for catchment averages the Gaussian type gives a sufficient approximation. Data, plotted on normal or logarithmic probability paper, give almost the same goodness of fit. *Subject Headings:* **1. Rain intensities 2. Statistical studies 3. Tapti River, India.**—*A. Assur.*

10M–145 551.577.36:519.2(498)

*Platagea, G., **Calculul stratului total de precipitatii H de diferite asigurari, dupa metoda lui G. A. Alekseev in conditiile R.P.R.** [Calculating frequencies of specified total precipitation amounts by G. A. Alekseev's method under conditions prevailing in Romania.] *Meteorologia şi Hidrologia*, Bucharest, 1(2):14–24, Dec. **1956.** 7 tables, 3 refs., 9 eqs. **DWB**—Alekseev's method of rainfall probability calculation (1941) is examined in detail. Maximum 24-hour precipitation amounts liable to occur once in 1, 10, 50, 100 and 500 years for 56 stations in Romania, along with values of the parameters from which the amounts were obtained. *Subject Headings:* **1. Rainfall probabilities 2. Precipitation amount 3. Romania.**—*G.T.*

10M–146 551.577.36:551.583.13:517.512.2(52)

Takasaki, K., **On the periodicity in precipitations.** *Journal of Meteorological Research*, Tokyo, 3(9):323, July **1951.** In Japanese. **DWB**—Brief note—no data. *Subject Headings:* **1. Precipitation frequencies 2. Periodicities 3. Periodogram analysis 4. Japan.**—*M.R.*

10M–147 551.577.36(747)

*U. S. Weather Bureau, **Maximum station precipitation for 1, 2, 3, 6, 12, and 24 hours, Pt. 10, New York.** Its *Technical Paper*, No. 15, Pt. 10, Dec. **1954.** 113 p., diagrs., almost entirely tables. Price: $.60. **DWB**—The sources of the data for this compilation are the Hydrologic Bulletin, Climatological data WB Form 1017, triple-register sheet, WB Form 1030, and Tables of Excessive Precipitation from the Report of the Chief of the Weather Bureau. The period of record, except at Weather Bureau first-order stations is limited to 11 years. The time intervals used in most of the survey and tabulations began on the hour. The stations, names and locations are shown on maps. *Subject Headings:* **1. Excessive rainfall frequencies 2. New York, N. Y.**—*I.L.D.*

10M–148 551.577.36(436.14)

*Zawadil, Rudolf, **Die Wahrscheinlichkeit von Niederschlägen ab 5 mm in Wien (Normalwerte für 1901–1950).** [Probability of precipitation 5 mm and more in Vienna (normals 1901–1950).] *Wetter und Leben*, 4(1/2):34–35, Feb. **1952.** table. **DWB**—Statistical calculation made for each day and month of the year. The probability of precipitation is highest in June and July (23–25%); from Sept.–Dec. it is 17% (highest). The maximum probability for Feb. is near 12%. The lowest percentage is from July–Aug. (9%), in autumn 4–6%; in winter months 5%, and from May–June 7%. *Subject Headings:* **1. Precipitation frequencies 2. Vienna, Austria.**—*N. T. Zikeev.*

Excessive Precipitation (551.577.37)

10M–149 551.577.37:551.515.8(520)

Aota, T., **On the heavy rainfall on Tohoku District due to the Southward movement of cold front on August 13–14, 1953.** *Japan. Central Meteorological Observatory, Tokyo, Memoirs*, 38(3/4):

409–414, July **1954.** 10 figs., table. In Japanese; legends and summary in English. **DWB**—T
author analyzes the heavy rainfall on Aug. 13–14, 1953, from the standpoint of forecasting, a
points out that the heavy rainfall was caused by the southward movement of the cold front to t
convergence zone in the west air mass. Further the author examines whether the quantitati
forecasting of precipitation is possible or not. *Subject Headings:* **1. Excessive rainfall 2. Rainf
forecasting 3. Cold fronts 4. Japan.**—*Author's abstract.*

10M–150 551.577.37:551.515.42(8

El temporal del 25 al 27 de Mayo de 1953. [The storm of May 25–27, 1953.] *Chile. Un
versidad. Instituto de Geografía, Informaciones Geográficas*, 3(1/2):43–45, June **1953.** table. **DW**
The typical pressure pattern which usually leads to thunderstorms in Chile is described. T
thunderstorm of July 25–27, 1953, followed such a typical pattern. A day-by-day description
weather development from May 22 to May 28 is given. Damage caused by the torrential rains ar
floods is specified. *Subject Headings:* **1. Thunderstorm rainfall 2. Chile.**—*G.T.*

10M–151 551.577.37:551.577.51(412.1

Bonacina, L. C. W., **Growth of a Highland rainstorm.** *Weather*, London, 12(12):393, Dec. **195**
DWB, DLC—Brief description of a few scattered showers (at 3 p.m.) which spread and develope
into a wide spread rainstorm of torrential nature by 4–6 p.m. This occurred on a trip near Kingussi
Strathspey, Invernessshire in the Scottish Highlands on July 12, 1957. He suggests that readers
weather should keep careful watch of the growth of rainstorms in mountainous districts. *Subje
Headings:* **1. Mountain rainstorm development 2. Invernessshire, Scotland.**—*M.R.*

10M–152 551.577.37:551.579.4(54

Bose, N. K. (*Dir. River Res. Inst., West Bengal*) and Nag, S. K. (*Damodar Valley Corp.*), **Analysis
of certain flood rainfalls in the Damodar catchment.** *I.U.G.G. International Association of Scientifi
Hydrology, Brussels, 1951,* [*Transactions*], 4:76–85, **1952.** 4 tables, 8 figs., 4 refs. **DWB**—Stud
based on six rainstorms, which caused major floods, showing rainfall and the resulting hydrograph
Runoff ratio for the first day was 10% on dry and 30% on wet soil, increased during the followin
days, but did not exceed 60.5% for any of the floods. Concentration time less than 46 hrs. *Subje
Headings:* **1. Floods 2. Excessive rainfall 3. Damodar catchment, India.**—*A.A.*

10M–153 551.577.37:551.577.61(794

*Burke, M. F., **Report on Floods of January 15–18, 1952.** Los Angeles, Calif., Flood Contro
District, Aug. **1952.** 20+p. 2 figs. (fold.), 20 plates (fold.), 10 tables. **DWB**—An elaborat
study of the cyclone and frontal systems which produced torrential rains on Jan. 15–16 and 17–18
1952, in the Los Angeles area. Forecasts, observed rainfall at numerous stations, areal time an
intensity distribution of rainfall, peak runoff, comparison with previous flood peaks and dam operatio
statistics, are presented in tables, mass-curves, isohyetal charts and other graphic forms and discussed
The storms occurred after 7 dry years, but with watersheds saturated from rains which had just
occurred. The type of storm could be expected every 3 or 4 years. The maximum amounts recorde
were 11–15 in. compared to 24–37 in. for the same stations in the 1943 flood. At some places thi
amount has been exceeded about 10 times in the past 70 years. Most of the damage was due to muc
slides in new residential developments. *Subject Headings:* **1. Floods 2. Excessive rainfall 3. Mass
rainfall curves 4. Los Angeles, Calif.**—*M.R.*

10M–154 551.577.37(438)

†*Chomicz, Kazimierz, **Vlewy i deszcze navalne w Polsce.** [Heavy rains and cloudbursts in
Poland.] *Poland. Państwowy Instytut Hydrologiczno-Meteorologiczny, Wiadomości Sluzby*, 2(3):
178–260, **1951.** 21 figs., 107 refs. **DWB**—A detailed critical analysis of methods (HELLMANN,
VOEĬKOV and others) of analyzing information and data on heavy rains and cloudbursts adopted in the
pre-war years in Poland, other European countries and the U. S., is presented and discussed. After
having shown the inadequacy of the scales used at present, the author proposes the introduction of
his own classification of unusually heavy rains and gives a complete description of the phenomena in
Poland classified by this scheme and based on all available observational data. The paper is divided
into two parts: Part I—Criteria for classification of heavy rains and cloudbursts—examines present
methods of classification; the definition and scheme of the new classification; arguments in favor of
the proposed classification; and reviews the most important schemes used in other countries. In
Part II—The situation in Poland—the state and results of extensive investigations and the in-
tensivity, duration, time of occurrence, distribution, and extent of heavy rains and cloudbursts are
discussed; a list of recording stations is given, and 3 most unusual cases of cloudbursts are examined.
Numerous tables, graphs and a chart, showing the distribution of zones with similar characteristics,
and a list of 109 references are included. *Subject Headings:* **1. Excessive rainfall 2. Rainfall
analysis 3. Poland.**—*A.M.P.*

10M–155 551.577.37

Chomicz, Kazimierz, **Sur la quéstion d'une echelle internationale pour la classification des pluies à grande intensité.** [The problem of an international scale for the classification of rainfall of great intensity.] *I.U.G.G. International Association of Scientific Hydrology, Brussels, 1951,* [*Transactions*], v. 3:26–32, **1952.** 6 figs., 2 tables, eqs. **DWB**—Data are given for the most intense rainfall with varying duration (3 min. to 365 days) observed in the world between 1841–1950. Cherrapunji, India holds the records for 4 days up to a year. The values follow closely the law $r_k = 2^{k/2}i^{\frac{1}{2}}$ with k equal to 10 11. Author compared depth-duration curves proposed by BERG, SPECHT, and HELLMANN with his own results for Warsaw and come to the conclusion that intense rainfall could be classified according to the parameter k. For example, rains with $5<k<6$ are downpours of fifth degree (R_5). A transparent scale is presented for the evaluation of downpours (R_3), great showers (R_3) and showers (R_1). *Subject Headings:* **1. Intense rainfall 2. Intense rainfall classification 3. Depth-duration curves.**—*A. Assur.*

10M–156 551.577.37(421)

Court, H. T., **An August storm near London.** *Weather,* 7(9):268–269, Sept. **1952. DWB**—At Boreham Wood, 12 miles N.W. of London, Aug. 6, 1952, 4.83 in. of rain fell, 3.25 in. in less than 2 hours. *Subject Headings:* **1. Cloudbursts 2. England.**—*C.E.P.B.*

10M–157 551.577.38(78)

Dale, Tom (*Soil Conservation Service*), **When drought returns to the Great Plains.** *U. S. Dept. of Agriculture, Farmers' Bulletin,* No. 1982, March **1947.** 14 p. photos. **DWB**—A farmers bulletin that describes drought conditions in the Great Plains and tells what to do if drought comes, and if a long drought occurs. Most years there are short droughts but every decade or so there is a drought that may continue for several years. The time to prepare for drought is during the wet years. *Subject Headings:* **1. Drought 2. Great Plains, U. S.**—*M.R.*

10M–158 551.577.37(778)

Decker, Wayne L. (*Assoc. Proj. of Climatology, Univ. of Missouri*), **Swamp weather in the lowlands of Southeast Missouri 1957.** *Weatherwise,* Boston, 11(4):130–131, Aug. **1958.** 3 figs., table. **DWB**—Over 90 in. of rain fell in 1957 in parts of southeast Missouri. The 6 counties are flat and swampy but are 70% devoted to agriculture (cotton, corn, etc.). All months but March and Sept. had above normal rainfall, with maximum rainfall in this region in 11 months. Thus 1957 was wettest in 90 years for this region. Unofficial reports of over 100 in. have been received. This was heaviest of any part of U. S. except the extreme Pacific Northwest. *Subject Headings:* **1. Record rainfall 2. Southeast Missouri.**—*M.R.*

10M–159 551.577.37:551.513.2(477)

*Drogaĭtsev, D. A., **Formirovanie anomalii osadkov na Ukraine.** [The formation of the precipitation anomaly in the Ukraine.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geogr.,* No. 3:15–22, **1957.** 4 figs., table, 4 refs., 3 eqs. **DWB**—The synoptic conditions associated with extreme precipitation are investigated from the point of view of meridional atmospheric heat transport which is evaluated approximately by means of the relative baric topography RT_{1000}^{500}. The meridional heat transport was studied by averaging RT_{700}^{500} charts for natural synoptic periods, and the heat transport for the period preceding winter (Oct.–Dec.) was investigated. The method for evaluating quantitatively the meridional transport of heat and cold is described. The years 1945 and 1955 ,with extreme precipitation anomalies and anomalies of opposite sign in the Ukraine, were preceded during the pre-winter months by fields of meridional transport which were of antithetical structure and which embraced all Europe. In the pre-winter before a dry year the axis of heat advection lay westward, while that of cold advection lay eastward from the area over which precipitation was examined; the situation was reversed for the pre-winter of a year with extensive precipitation. The amount of precipitation in April–June, inclusive, in the Ukraine was closely correlated with the value $D=(A-B)-(B-C)=A-2B+C$, where the terms of D are the sums of indices of meridional heat transport in the preceding pre-winter, each computed according to six points of intersection of parallels 35°, 40° and 45° with meridians for A—30°W and 20°W, for B—10°E and for C—50° and 60°E. The correlation coefficient calculated for 18 years between the index D for the preceding winter and the precipitation was $r_s=0.67$ for the northern Ukraine and $r_s=0.70$ for the southern Ukraine (the random correlation coefficient is 0.5897). The hypothesis of the physical relationship of correlated values and the constancy of this value in time has a probability greater than 0.99. The regression equations on D are $R_n=164.8+0.779D$ and $R_s=144.2+0.904D$. The correlation coefficient between the preceding pre-winter period and the first half of the approaching year (Jan.–June) was $r_s=0.66$ and $R_s=231.4+1.1150D$ and $r_n=0.67$ and $R_n=261.93+1.084D$. *Subject Headings:* **1. Precipitation anomalies 2. Meridional heat transport 3. Precipitation extremes 4. Ukraine.**—*I.L.D.*

10M–160 551.577.37/8(468.3

*Due Rojo, Antonio (*Dir., Cartuja Obs., Granada*), **Periodos secos y humedos en Granada.** [Dr and wet periods in Granada.] Coimbra, **1957.** 10 p. table, chart. At head of cover-p: Asso ciação Portuguesa para o Progresso das Ciências. "Presented at 2nd Section of 23 Congresso Luso Espanhol, Coimbra, 1956." **DWB**—Length of dry and wet spells at Granada are analyzed and th data are presented in a table and several graphs on: 1) mean annual length of dry periods; 2) mea annual length of wet periods; 3) maximum length of dry spells; 4) maximum length of wet spell 5) maximum length of "absolute" dry; and 6) maximum length of "absolute" wet spells for 50 year (1903–52). The longest dry spell was 5 months, or 147 days centered on Sept. (1918). The max mum wet spell was 20 days. The difference between dry spells and absolute dry spells lies in th fact that a day or two with light rain may interrupt a drought according to the first criteria, when i effect the drought continues through these minor interruptions. *Subject Headings:* **1. Dry spell 2. Wet spells 3. Drought 4. Precipitation extremes 5. Granada, Spain.**—*M.R.*

10M–161 551.577.37(767

*Dye, L. W. (*Weather Bureau, Kansas City, Mo.*), **Wettest years in Arkansas.** *U. S. Weathe Bureau, Weekly Weather and Crop Bulletin*, 45(17):7–8, April 28, **1958.** 4 charts, table. **DWB DLC**—The author concludes from the data so far obtained this 1957 was Arkansas' wettest year Most stations had more than 70 in. of rain during the year. The long-term means for most station were less than 50 in. Precipitation exceeded this figure by 20 in. at most. The greatest rainfall wa 98.5 in. at Newhope. Of the 53 stations studied, 22 had more rain in this year than in any other year Precipitation at most stations exceeded the long-term means in 10 months of the year. The heav rains over all the parts of the state ended several years of severe drought. The floods were not s damaging as that of 1927. *Subject Headings:* **1. Wet years 2. Record rainfall 3. Arkansas.**—*N.N*

10M–162 551.577.37:551.437(774

Eichmeier, Albert Henry; Wheaton, R. Z. and Kidder, E. H., **Preliminary report of excessive precipitation over Sloan Creek Basin, a small watershed.** *Michigan. Agricultural Experimen Station, East Lansing, Quarterly Bulletin*, 41(4):889–893, May **1959.** fig., 3 tables. **DLC**—Both the widespread and showery types of rainfall in the state of Michigan are discussed, but details are given on continuous precipitation, runoff, and the periodic sediment measurements of excessive rainfall recorded from 1956–1958 in the 9.34-sq mi area of the Sloan Creek Basin. On Aug. 9, 1956 precipitation averaged 2.5 in. at East Lansing. This is the highest single catch since 1910. Three excessive storms occurred from July 4–11, 1957, totaling 6.82 in. The probability of such occurrence in 8 days is about once in 100 years. *Subject Headings:* **1. Excessive precipitation 2. Sloan Creek Basin, Michigan.**—*N.N.*

10M–163 551.577.37(777)

*Elford, C. Robert (*Climatologist, WBO, Des Moines*), **A new one-minute rainfall record.** *Monthly Weather Review*, Wash., D. C., 84(2):51–52, Feb. **1956.** 2 figs., table, 3 refs. **Comments by:** Douglas M. A. Jones and Floyd A. Huff (*both, State Water Survey Div., Urbana, Ill.*), and **Reply** by: Elford. *Ibid.*, 84(6):235, June **1956.** p. 235. **DWB, DLC**—On July 10, 1955 a U. S. and possibly a world's record rainfall of 0.69 in./min for 1.4 min was established at the Nahnsen farm 11 miles north of Jefferson in Greene County, W. Central Iowa. The rain was caught in a U. S. W. B. 9-in. unshielded Universal recording gage. About 3 in. of rain had fallen in the previous 3 hours. The storm ended about 20 min. after this heavy downpour. Radar at Des Moines Airport 55 mi SE showed strong echoes to 50,000 ft at midnight. Other recordings such as at Opid's Camp, Calif., April 5, 1926 (0.65 in.) and at Porto Bello, Panama (0.82 in./min) are cited. JONES and HUFF advise caution in accepting record 1-min. rainfall values calculated by ELFORD for Jefferson, Iowa, since clock on gage may have been stopped or running slow, and since 0.10 min is too small a time interval to measure on such charts. Elford replies that all of these factors were carefully considered for 6 months before accepting values as valid, and that they are accurate as any other records for comparable time intervals. The clock could not run slow without stopping and evidence is that time arcs are true for that recorder. *Subject Headings:* **1. Record rainfall 2. Jefferson, Iowa. I. Jones, Douglas, M. A. II. Huff, Floyd A.**—*M.R.*

10M–164 551.501.81:551.577.37:(522)

Fujiwara, M. and Toya, K. (*both, Met. Res. Inst., Tokyo*), **An occurrence of a local heavy rainfall on a stationary front (Baiu Front).** *Papers in Meteorology and Geophysics*, Tokyo, 9(1):40–47, May **1958.** 4 figs., 2 refs. Japanese summary p. 47. **DWB**—The present paper describes the results of an analysis of the storm that occurred in Northern Kyushu from July 3–5, 1957, exceeding 200 mm/day in a region of 3×10^4 km². In relation to isohyetical patterns and typical patterns of echo taken by three PPI photographs, it is concluded that a low-level southerly jet had matured in a

surface layer and convective instability had been developed strongly, before the formation of the stationary rainbands. The development of the low-level jet may have some relation with the surface isobaric situation, the feature of which is the persistence of a subtropical high to the south of a wave crest of a quasi-stationary front. Lastly, the forecast of the local heavy rain is illustrated. *Subject Headings:* **1. Radar analysis of precipitation 2. Excessive rainfall 3. Bai-u rainfall forecasting 4. Japan.**—*K.C.*

10M–165 551.577.37:551.515.4(766)

Hamilton, John W. (*W. B. A. S., Oklahoma City*), **Excessive rains in conjunction with severe weather.** "Paper presented at AMS meeting, Stillwater, Okla., Oct. **1955.**" 8 p. 6 refs. Carbon of typescript. **DWB**—Thunderstorms, heavy rains and precipitation in some parts of Oklahoma were studied by the Weather Bureau Storm Detection Department during May 1955. About 25 miles southeast of Lawton the top of a thunderstorm cell extended at one observation to 45,000 feet, its diameter being only 10 miles as compared to 15 to 25 miles previously recorded at Lawton. Severe weather forecasts were issued for the Texas Panhandle and southwestern Oklahoma areas, covering 40 mi on either side of a line that extended from 30 mi NNE of Lubock to 15 ESE of Lawton. The quasistationary front, as well as the dew point (65° to 75° in some areas) were also studied and mapped. Recommendations are made for delineating between areas of heavy rain and those of severe thunderstorms and the use of all available synoptic data to interpret radar echoes is suggested. *Subject Headings:* **1. Excessive rainfall 2. Thunderstorms 3. Oklahoma.**—*N.N.*

10M–166 551.577.37(213)

Hershfield, David Michael and Wilson, Walter T. (*Hydrologic Services Div., U. S. W. B.*), **A comparison of extreme rainfall depths from tropical and non-tropical storms.** Wash., D. C., U. S. Weather Bureau, Nov. **1958.** 35 p. 11 figs., 7 tables, 18 refs. Mimeo. **DWB** (M77.37 U587co)—The hydrologic characteristics of tropical rainfall are examined and compared with those of the non-tropical rainfall, and data are given. With respect to the frequency distribution of annual maxima for durations of 10 min. to 168 hours, the shape of the area-depth curve up to 5000 sq. mi. the time distribution within the largest 24- and 48-hour rainfall, and the time sequence or mass curves, extreme rainfall associated with tropical storms does not differ significantly from extreme rainfall associated with other types of storms. *Subject Headings:* **1. Tropical rainfall extremes 2. Rainfall extremes 3. Rainfall-depth-duration curves.**—*N.N.*

10M–167 551.577.37(52)

Hirasawa, Kenzo, **Outline of rainfalls in warm season, 1953.** *Japan. Central Meteorological Observatory, Tokyo, Memoirs,* 38(3/4):297–302, July **1954.** In Japanese; legends and summary in English. 2 figs., table. **DWB**—The meteorological conditions in the warm season of 1953 were very unusual, and heavy rainfalls were frequent all over Japan, as shown in a table. Surface maps indicate that such heavy rains are associated with the Bai-u front. Broad-scale patterns also show that such heavy rains are connected with the outbreak of polar air masses intensified by anticyclones around the North Pole and with the meridional circulation intensified by the blocking action frequently occurring in the Pacific Ocean or on the Eurasian Continent during the warm season. *Subject Headings:* **1. Excessive rainfall 2. Bai-u 3. Polar fronts 4. Japan.**—*Author's abstract.*

10M–168 551.577.21:551.577.37(944)

Hounam, C. E., **Occurrence of extreme 24 hour rainfall over New South Wales.** (In: Australia. Bureau of Meteorology, **Conference on estimation of extreme precipitation, Melbourne, April 1958.** Melbourne, Dec. **1958.** p. 57–68. 3 maps, 2 refs.) **DWB**—The highest recorded 24 hour rainfall totals since 1914 were plotted and isohyets drawn, indicating an unsteady increase from under 4 in. in the far west to over 15 in. on the coast with an extreme of 25 in. at Dorrigo. This map was then modified by selecting the highest fall in each representative climatic zone, either a one-degree square or smaller, according to the orography of the district, and constructing another set of isohyets which represents the falls which might have occurred had the storm taken a slightly different course. Generally speaking, values depicted on this map are only slightly higher than those on the first map and their probability is, for design purposes, relatively high, although in most cases they are, to date, only the experience of a neighbor. Extending the transposition of one phenomenal storm elsewhere over the State, a composite map is arrived at, based, for areas west of the Divide, on transposed extreme values and, east of the Divide on extremes broadly representing climatic zones. Although the chances of receiving these rainfall values are more remote in most cases, except in coastal areas, than those shown on the second map, they still represent definite possibilities within the range of State experience and have not been maximized to the intangible level. *Subject Headings:* **1. Excessive rainfall 2. Isohyetal charts 3. New South Wales.**—*Author's abstract.*

10M–169 551.577.37(422

Hurst, G. W., **"Very rare" rainfall at Wyton, Huntingdonshire.** *Meteorological Magazine*, London, 83(986):247–248, Aug. **1954. DWB**—July 5, 1954, 3.32 in. in 2¼ hr, including 3.15 in. in 105 min. A good deal of flooding occurred. The synoptic situation is briefly described. *Subject Headings:* **1. Excessive rainfall 2. Wyton, England.**—*C.E.P.B.*

10M–170 551.501.81:551.577.3

§Imai, Ichiro (*Met. Res. Inst., Tokyo*), **Radar and meso-scale analyses of a heavy local rainfall.** *Weather Radar Conference, 7th, Miami Beach, Florida, Nov. 17–20, 1958, Proceedings*, issued 1959, Sec. I:26–32. 8 figs., ref. **DWB** (M01.81 R124pc, 1958)—Radar and meso-scale synoptic analyses of heavy local rainfall are made for the case of Aug. 7, 1957. The development of rain area is explained by the generation of cell echoes and their development and movement. It is found that new cells are generated rather continuously along a line or in a limited area, but the cause is not clear. *Subject Headings:* **1. Mesoanalysis of rainfall 2. Radar analysis of rainfall 3. Heavy rainfall.**—*Author's abstract.*

10M–171 551.577.37(524

Izawa, T., **On the heavy rains in Hokkaido.** *Tateno. Aerological Observatory, Journal*, 5(1):9 March **1951. DWB**—Abstract of paper presented at meeting. Discussion of a record-breaking rain in the summer of 1950 from the aerological point of view. Rain was caused by a cyclone at the 400 mb height, which was unrecognizable on the surface pressure map. *Subject Headings:* **1. Cold lows aloft 2. Excessive rainfall 3. Hokkaido, Japan.**—*A.A.*

10M–172 551.577.37(439.1

Kakas, József and Ozorai, Zoltán, **A 24 órai csapadék abszolút maximuma Magyarországon.** [Absolute maximum of 24-hour precipitation in Hungary.] *Időjárás*, Budapest, 59(6):344–350 Nov./Dec. **1955.** 2 figs. Russian and English summaries p. 344. **DWB, DLC**—On June 9, 1953 a rainfall amount of 260 mm (approx. 10 in.) was measured and officially verified in Dad, northwestern Hungary. This is an all-time record for precipitation measured at any place in Hungary within 24 hours. The synoptic situation, upper-air conditions and moisture supply which combined to produce the torrential rain and hail storm are described. *Subject Headings:* **1. Record rainfall 2. Dad Hungary.**—*G.T.*

10M–173 551.577.37:551.579.4(433

Kern, Helmut and Völk, Joseph, **Die meteorologischen Ursachen und der Ablauf des Donau-hochwassers im Juli 1954 in Bayern.** [Flood of the Danube in Bavaria in July 1954 and its meteorological causes.] *Deutsches Gewässerkundliches Jahrbuch, Besondere Mitteilungen*, Koblenz, No. 12 85–92, **1955.** 2 figs., table. **DWB**—The synoptic development which led to the flood-producing rainfall of July 7–11, 1954, is described. Precipitation and discharge data are presented. The various circumstances which combined in building up the record flood are analyzed. *Subject Headings:* **1. Excessive rainfall 2. Floods 3. Bavaria, Germany.**—*G.T.*

10M–174 551.577.37:551.509.317:551.524.7(52)

§Kitaide, M., **The mechanism of the typical rainfall in the Hokuriku district.** *Meteorological Society of Japan, Journal*, Ser. 2, 32(9/10):306–311, Sept./Oct. **1954.** 5 figs., 2 tables, 8 refs. In Japanese. **DWB**—Situation on several occasions analyzed synoptically, with upper air cross-sections to 200 mb, etc. Cold pools play an important role in rain formation. *Subject Headings:* **1. Synoptic case histories for heavy rain 2. Cold pools 3. Synoptic aerological studies 4. Hokuriku district, Japan.**—*M.R.*

10M–175 551.577.37/8(439.1)

*Kulin, István, **Az 1952. évi ősz rendkívüli csapadékbőségének és az 1953. évi ősz rendkívüli csapadék hiányának vizsgálata éghajlati és mezőgazdasági szempontból.** [Study of the period of extreme rainfall in the fall of 1952 and of the extreme rainfall deficiency of the fall of 1953 from the climatological and agricultural points of view.] *Beszámolok az 1955-ben végzett tudományos kutatásokról (Hungary. Országos Meteorológiai Intézet, Hivatalos Kiadványai*, Vol. 20, pub. **1955**), p. 25–40. 15 figs. Russian and French sumaries p. 25–26. **DWB**—Rainfall data for Hungary in the fall of 1952 and 1953 (Sept.–Dec.) are presented in charts showing total amounts, deviation from normals (1901–1940) and comparison with earlier extremes (1901–1950). Both the excessive rainfall of Sept.–Dec. 1952 and the deficiency of Sept.–Dec. 1953 are found to have been quite extraordinary in eastern Hungary. *Subject Headings:* **1. Excessive rainfall 2. Rainfall extremes 3. Hungary.**—*G.T.*

10M–176 551.577.37(438)

Lambor, Julian (*Warsaw*), **Maksymalne natężenie deszøszov o określonym prawdopodobieństwie pojawania się na terytorium Polski.** [Maximum intensity of rainfall of a determined probability in Poland.] *Acta Geophysica Polonica*, Warsaw, 1(3/4):162–170, **1953.** table, 8 eqs. **DWB**—Pluviographic records and daily data are used in order to calculate the frequency of rainfall of great intensity. Formulas valid from 1 min to 1 year are derived. The essential parameter shows some relation to normal annual precipitation so that the equation can be adjusted to various geographical regions. *Subject Headings:* **1. Rainfall intensities 2. Rainfall depth-duration curves 3. Poland.**—*A.A.*

10M–177 551.577.37:551.501.45(438)

Lambor, Julian, **Związki charakterysujące najawiększe opady na ziemiach polskich.** [Characteristics of heavy rainfalls in Poland.] *Przegląd Meteorologiczny i Hydrologyczny*, No. 1/2:15–40, **1952.** 6 figs., 4 tables. English summary p. 40. **DWB**—The relation between duration, intensity of heavy rainfalls and the area covered has been determined by Rożanki, Pomianowçki and Lindley, using too short a period of observation. The new equations presented here were computed from observational data for about 40 years. The formulas are given in two modifications: for the usual heavy rainfalls and for heavy rainfalls which continued for more than 300 minutes, because the latter have a different character. The so-called "table by Specht," showing the relationship between intensity, duration and area of rainfall has been corrected by the author and is presented in this work. *Subject Headings:* **1. Excessive rainfall 2. Rainfall data analysis 3. Poland.**—*N. T. Zikeev.*

10M–178 551.577.37(73)

Ludlum, David M. (*ed.*),**Spring's thermal capriciousness.** *Weatherwise*, 7(4):104–106, Aug. **1954.** 4 figs. **DWB**—Describes and illustrates with isothermal and isohyetal charts the May and June weather conditions over the U. S., with remarks on early May cold spell, the deluge in Boston in May (13.38" at Logan Airport is most ever recorded in a month in Boston since 1818), producing floods and general damage. Texas had greatest flood following worst drought in history. Floods also occurred in Iowa. *Subject Headings:* **1. Excessive rainfall 2. Floods, U. S. (1954) 3. Boston, Mass.**—*M.R.*

10M–179 551.577.37(569.4)

Mané, K. U., **A severe rainstorm in the coastal plain of Israel.** *Israel. Meteorological Service, Series D, Contributions* No. 8:115–119, **1956.** fig., 5 tables.—Reprinted from: *Israel Exploration Journal*, Jerusalem, 6(2), **1956. DLC**—On Nov. 8–9, 1955, heavy rain fell in a narrow belt from Tel Aviv to beyond Kafr Oasim (18 km to the E). At the latter place 255 mm fell in the 24 hrs beginning 8 h on the 8th, of which 194 mm probably fell in 4 hrs. These were much greater than previous records and did much damage. They were due to a small depression moving east across the coastal plain. *Subject Headings:* **1. Excessive rainfall 2. Israel.**—*C.E.P.B.*

10M–180 551.577.37:551.417(52)

Mano, Hiroshi and Okazaki, Genji, **Effect of coast on precipitation.** *Journal of Meteorological Research*, Tokyo, 6(10/11), Dec. **1954.** 8 figs., 2 tables, 3 refs. In Japanese; English summary p. 473. Also in: *Sendai, Japan. Central Meteorological Observatory, Bulletin of the Meteorological Society for Research of Tohoku District*, 8(2):473–481, Jan. **1955. DWB**—The coastal precipitation maxima in the Bai-u season and winter are illustrated by rainfall maps of Aomori and Niigata Prefectures. Such coastal rainfall maxima may be explained by the frictional effect which is due to the frictional convergence, the lifting in an on-shore wind and the sudden increase of vertical mixing at the coastline. The rainfall map over Kantō also suggests the existence of secondary and tertiary maxima further inland, which might be explained in connection with a standing wave due to frictional effects. *Subject Headings:* **1. Precipitation maxima 2. Coastal effects on precipitation 3. Japan.**—*Authors' abstract.*

10M–181 551.578.7(47) 551.577.37(47)

Mil'kov, F. N. and Kovalev, IA. K., **Sil'nyĭ liven' i ego posledstviia.** [A strong downpour and its consequences.] *Priroda*, 44(10):107, Oct. **1955. DLC**—The downpour accompanied by hail occurred on July 1, 1954, northwest of Usman, Lipetsk Region, lasted 20–30 min and embraced an area of about six sq km. The resulting overflow of the Usman River caused destruction to crops, cattle and river fauna, crayfish in particular. *Subject Headings:* **1. Excessive rainfall 2. Hailstorms 3. Lipetsk, U.S.S.R.**—*I.L.D.*

10M–182 551.577.37(52)

§Misawa, Zin-ichi, **On the heavy rainfall in the Bai-u season in Shimane Prefecture (first report).** *Journal of Meteorological Research*, Tokyo, 6(9):465–469, **1954.** 9 figs., 2 tables, 4 refs. In Japanese.

DWB—Synoptic studies on the heavy rainfall during the Bai-u season, without physical investi
tions. *Subject Headings:* **1. Bai-u rainfall 2. Synoptic studies 3. Japan.**—*H. Arakawa.*

10M–183 551.577.61 : 551.577.37 :551.579.4 (77

§*Nash, W. P. and Chamberlain, L. W. (*both, WBAN Analysis Center, U. S. W. B., Was*
D. C.), **Some aspects of the heavy rains in the Chicago area, October 9–11, 1954.** *Monthly Weath*
Review, Wash., D. C., 82(10) :305–316, Oct. **1954.** 24 figs., table, 15 refs. **DWB, DLC**—A synopt
dynamic case history study of a flood-producing storm. A tongue of warm moist air feeding in
the Chicago area on Oct. 9–11, 1954, gave the heaviest rainstorm in 69 years (5.63 in. in 24 hours
the U. S. W. B. Office and 10 in. to 12.5 in. in 30 and 48 hours at Cooperative stations in area.
resulted in Chicago's worst flood in history with $10 million damage in Chicago and $15 million in t
suburbs. A small tornado occurred at Homewood on the 10th (see BRUNK, 1954). Heavy rai
also fell in Michigan, Wisconsin, W. Ohio, E. Iowa. Data from 80 locations in the Chicago area a
type of gage, are tabulated. Convergence in the frontal area initiated the rain, but for the 48-ho
period following the first 8 hours, Chicago was in the warm sector. *Subject Headings:* **1. Excessi
rainfall 2. Floods 3. Flood damage 4. Mid-West United States 5. Chicago, Ill.**—*M.R.*

10M–184 551.577.37 (5

*Niigata, Japan. Meteorological Observatory, **On the heavy rainfall in Hokuriku Distri
during bai-u season of the year 1952.** *Japan. Central Meteorological Observatory, Tokyo, Memoi*
38(3/4) :414–429, July **1954.** 8 figs., 3 tables. In Japanese; legends and summary in Englis
DWB—Heavy rainfalls occurred in Hokuriku District (all over the area covering the eastern part
Fukui Prefecture and Niigata Prefecture) during the period June 30–July 1, 1952. The presei
study on this rainfall was made by the members of the Forecasting Section, Niigata Local Meteor
logical Observatory from the following points of view: 1) details of rainfall, 2) surface map analysis
3) upper air analysis. The damage caused by this rainfall is also discussed. *Subject Heading*
1. Excessive rainfall 2. Bai-u 3. Synoptic analysis 4. Japan.—*Author's abstract.*

10M–185 551.577.37 (747

No pattern. *New Yorker*, 29(16) :31–32, June 6, 1953. **DWB**—Editorial-style article on th
rainy period Jan.–May 1953 which brought 25.62 in. of precipitation to New York, exceeded onl
once since 1871. The effect of rain on various professional activities is mentioned. Atomic Energ
Commission and U. S. Weather Bureau are quoted as discarding the theory attributing abnorma
weather development to atomic explosions. Moreover, it is stated, a single departure from averag
values does not constitute a change in the long-term weather pattern. *Subject Headings:* **1. Excessiv
rainfall 2. New York.**—*G.T.*

10M–186 551.577.37 (474.5

Ol'shauskas, S., **Maksimal'naia intensivnost' livneĭ na territorii Litovskoĭ SSSR.** [Maximur
intensity of showers in Lithuania.] *Lietuvos TSR Mokslų Akademija. Geologijos ir Geografijo
Institutas, Moksliniai Pranešimai*, 5 :153–157, **1957.** 3 refs., 5 tables. **DWB**—The distribution o
the most intense showers on the territory of the republic is analysed. The coefficients A and B o
ALEKSEEV's empirical formula are analysed regarding the conditions of Lithuanian SSR. *Subjec
Headings:* **1. Maximum rainfall 2. Rainfall intensities 3. Lithuanian SSR.**—*Author's abstract.*

10M–187 551.509.318 : 551.577.37 :551.579.1 (457.8

Palmieri, Sabino, **Alcune considerazioni sulla situazione meteorologica collegata alla alluvion
della Calabria dell'ottobre 1953.** [Some aspects of the meteorological situation associated with th
floods in Calabria during October 1953.] *Rivista di Meteorologia Aeronautica*, Rome 14(3/4) :17–23
July/Dec. **1954.** 8 figs., 9 refs., 4 eqs. Italian, French, English and German summaries p. 17
DWB—The atmospheric conditions that brought about the flood in Calabria in Oct. 1953 are de
scribed and some comments are made on the shape of the troughs at 500 mb. The relation betwee
the currents at the jet level and these phenomena is pointed out and an evaluation of the orographic
effect in the production of rainfall is also given. Finally, some characteristics of the general circula-
tion are emphasized, with reference to atmospheric conditions. *Subject Headings:* **1. Synoptic
conditions for heavy rainfall 2. Atmospheric circulation 3. Floods 4. Calabria, Italy.**—*Author's
abstract.*

10M–188 551.577.37

Pardé, Maurice, **Investigation sur la chronologie des averses.** [Investigation on the chronology
of downpours.] *International Union of Geodesy and Geophysics. Association of Scientific Hy-
drology, Oslo* 1948, [*Transactions*],1 :203–208, [**1950?**]. **DWB**—A general survey of occurrences of
intense rainfall all over the world recorded by pluviometers or derived from maximum river discharges
and other indicators. *Subject Heading:* **1. Excessive rainfall.**—*A.A.*

10M–189 551.577.37 : 551.577.61(459.1)

Pelletier, J. (*Lyon, Univ., Faculté des Lettres*), **Les grandes pluies d'Octobre 1951 en Sardaigne centrale et leurs effets morphologiques.** [The great rains of October 1951 in central Sardinia, and their morphological effects.] *Revue de Géographie de Lyon*, 27(4):450–459, **1952.** diagr., foot-refs. **DWB**—Exceptional rainfall (over 1000 mm in 102 hours) caused by stagnating cyclone (maritime polar air) over Sardinia and Sicily, surrounded by an extensive anticyclonal zone from northwest to northeast (continental polar air), resulted in catastrophic damage to transportation lines. General discussion devoted to erosion effects under different relief conditions. No data given. *Subject Headings:* **1. Excessive rainfall 2. Erosion 3. Sardinia.**—*A.A.*

10M–190 551.577.37:551.579(54)

Pramanik, S. K. and Rao, K. N. (*Met. Office, Poona*), **Hydrometeorology of the Damodar Catchment.** *Indian Journal of Meteorology and Geophysics*, 3(2):158–161, April **1952.** 5 refs. **DWB**—Highest possible rainfall from 1 to 7 days discussed in connection with a hydrotechnical project. Mean annual rainfall over the catchment is 51 in. (88% from June to Oct.). Regression formulas for seasonal and daily relationships between rainfall and discharge are given. This article from another source run as 5.7–165, July 1956. *Subject Headings:* **1. Maximum possible rainfall 2. Runoff forecasting 3. India.**—*A.A.*

10M–191 551.577.37(548.4):551.511

Rao, Y. P. and Hariharan, P. S., **Heavy rainfall in Deccan (Desh) on Aug. 30–31, 1956.** *Indian Journal of Meteorology and Geophysics*, Delhi, 10(2):231–234, April **1959.** 3 figs., ref. **DWB, DLC**—The unsettled conditions in the west central Bay of Bengal cause heavy rains along coastal Andhradesa but not in Deccan (Desh), yet the reverse occurred on Aug. 30–31, 1956. The note discusses the probable mechanism of this unusual heavy rainfall in Deccan. Noting the amount of rainfall, the observations concerning winds, stream lines and isotachs at different times are reported. Values of convergence in different areas computed by Bellamy's method are tabulated. It is concluded that convergence in the lower levels in the area and possibly divergence in the mid-troposphere caused the rainfalls. *Subject Headings:* **1. Excessive rainfall 2. Convergence and divergence 3. Deccan, India.**—*I.S.*

10M–192 551.577.37(545.5)

Record rainfall at Delhi. *Indian Journal of Meteorology and Geophysics*, Delhi, 9(4):386–388, Oct. **1958.** 5 figs. **DWB, DLC**—A 24-hour rainfall record of 10.48 in. was recorded for old Delhi on July 20–21, 1958. Hot weather data for different areas of the Provinces are discussed, and the frequency of seasonal (July–Oct.) 24-hour extreme rainfall at Delhi during 1875–1958 (84 years) and other years is graphed. *Subject Headings:* **1. Record rainfall 2. Long period records 3. Excessive rainfall frequencies 4. Delhi, India.**—*N.N.*

10M–193 551.577.37(437)

*Rein, František, **Srážková období na Milešovce.** [Rainy periods at Milešovka.] *Meteorologické Zprávy*, Prague, 11(2):32–36, **1958.** 4 figs., 2 tables, 2 refs. Czech and Russian summaries p. 32. **DLC**—A rainy period is defined as at least 5 consecutive days with rain totalling at least 3 mm. Rainy periods in 5 years of data for Milesovka Observatory are analyzed by month and season as to their basic characteristics. Precipitation abundance is determined for five selected synoptic types. It is found that the most abundant precipitation is associated with Central European cyclones while the least abundant precipitation occurs during situations in which a lee effect of the Krushne Hory prevails. *Subject Headings:* **1. Rainy spells 2. Milešovka, Czechoslovakia.**—*Transl. of author's abstract.*

10M–194 551.577.37:551.578.48(234.3)

Rudolph, A. M., **Quelques remarques sur les inondations des 13–15 juin 1957 dans les vallées septentrionales du massif du Grand Paradis.** [Some remarks about the floods of June 13–15, 1957, in the northern valleys of the Grand Paradise range.] *Revue de Géographie de Lyon*, Lyons, 33(2):195–200, **1958.** 7 figs., 2 tables, ref. **DWB**—The rain which fell from June 10–17, 1957, on the Grand Paradis Range was quite exceptional. During that period, the amount of precipitation collected was from 60 to 430 mm according to location, an amount which represents in some cases 30–40% of the quantity collected during a whole year. The author analyzes the morphological consequences of the numerous floods and of the large scale avalanche phenomena which occurred on this occasion. *Subject Headings:* **1. Excessive rainfall 2. Floods 3. Avalanches 4. French Alps.**—*A.V.*

10M–195 551.577.37:551.515.82 551.509.31

§Saito, Shoichi, **On a low of frontal heavy rainfall movement.** *Journal of Meteorological Research*, Tokyo, 6(7):230–237, Sept. **1954.** 8 figs., table, 5 refs. In Japanese; English summary p. 230.

DWB—In regard to the movement of frontal heavy-rainfall areas, ŌTANI has stated that there a two kinds of frontal heavy-rainfall movements, the one moving normal to a front and the oth parallel to it. In this paper, the above suggestion is examined by use of synoptic charts and it concluded that the suggestion is correct and useful. *Subject Headings:* **1. Frontal precipitatic 2. Synoptic analysis 3. Frontal movement.**—*Author's abstract.*

10M–196 551.577.37:551.542(52

*Saito, Shoichi; Miyoshi, N. and Narikawa, J., **On the characters (sic) of heavy rainfall i southern Kinki District and in eastern Kinki District during the summer 1953.** *Japan. Centr Meteorological Observatory, Tokyo, Memoirs*, 38(3/4):387–392, July **1954.** 10 figs., 5 tables. I Japanese; legends and summary in English. **DWB**—This paper is concerned with the character istics of the pressure distribution which caused heavy rainfall during the Bai-u season. A study c the heavy rains observed in July and Aug. 1953 in the southern Kinki and eastern Kinki District shows that the heavy rainfall was caused by upslope motion over the mountains, or by a cold fron of the convectively unstable air masses moving from Shikoku. *Subject Headings:* **1. Excessive rain fall 2. Bai-u 3. Pressure distribution 4. Kinki District, Japan.**—*Authors' abstract.*

10M–197 551.577.37:551.311.2(52) 551.311.2:550.341(52

Sakamoto, Takuma, **On the landslide in Nagasaki Prefecture, Northern Kyushu (1st report)** *Oceanography and Meteorology*, Nagasaki, 5(3/4):76–81, Dec. **1951.** 5 figs., 3 tables, 7 refs. I Japanese; English summary p. 81. **DWB**—The correlation between landslides, and earthquake or heavy rainfall is investigated. The study is based on records for the period 1900–1951 wit emphasis on the heavy landslides which took place in Nagasaki Prefecture in March–July 1951. It i found that landslides frequently occur in years, or a few years after major earthquakes; in cases o continuous rainfall over 500 mm landslides invariably occur; their degree is likely to be in proportion to the amount of precipitation. *Subject Headings:* **1. Earthquakes 2. Excessive rainfall 3. Land slides.**—*G.T.*

10M–198 551.577.37(452

*Santomauro, Luigi, **Contributo alla conoscenza del clima di Milano: La massima quantità giornaliera di precipitazioni atmosferiche.** [Contribution to the knowledge of the climate of Milan: Maximum daily precipitation amount.] *Milan. Osservatorio Astronomico de Milano-Merate Supplementi Meteorologici*, No. 4, **1951.** 7 p. tables. **DWB.** Also issued as *Istituto Lombardo di Scienze e Lettere, Milan, Rendiconti*, 85(1), [**1951?**]. **DLC**—In this monograph, which is the first in a series on the climatology of Milan, the maximum daily precipitation for each year from 1880–1949 is tabulated and analyzed statistically. During the 70 years the mean maximum daily precipitation varied from 49.6 to 78.8 mm, and the extreme from 28 to 156 mm (Oct. 14, 1892). *Subject Headings:* **1. Daily rainfall maxima 2. Rainfall data 3. Long period records 4. Milan, Italy.**—*M.R.*

10M–199 551.577.37(52)

*Sato, S., **Heavy rainfall at Owashi.** *Journal of Meteorological Research*, Tokyo, 4(12):1017–1020, March **1953.** 6 tables. In Japanese; English summary p. 62. **MH-BH**—Eight types of heavy rainfall are described, their frequency tabulated by months (mainly summer and autumn), duration and maximum hourly amount given and relations to weather types set out. The greatest amounts are due to typhoons; with a cyclone over Pacific and a front running E-W a heavy fall of short duration often occurs. *Subject Headings:* **1. Rainfall intensity 2. Heavy rainfall 3. Japan.** —*C.E.P.B.*

10M–200 551.577.37:551.577.51:551.515.8(52)

Seshimo, Y., **On the mechanism of heavy rainfall.** *Journal of Meteorological Research, Tokyo*, 5(9):712–719, Nov. **1953.** 16 figs., 7 refs. In Japanese; English summary p. 712. **DWB**—A heavy local rainfall at Aikawa and Akita in the early morning of Aug. 6, 1951, is investigated. The surface analysis shows that a long belt of rainfall extends on the Japan Sea side of northern Japan with three heavy rainfall areas at equal distances from each other, and heavy rainfall occurring before the frontal passage. According to the aerological analysis a narrow belt with strong wind is found in the layer below 700 mb along Japan proper. The belt is connected with a cold trough extending from the Okhotsk Sea to northern Japan and a convergence belt of SW wind due to the Ogasawara High. From these it appears that a squall line was formed and local heavy rainfall was produced by topographic effects. *Subject Headings:* **1. Heavy rainfall 2. Orographic rainfall 3. Trough structure 4. Japan.**—*Author's abstract.*

10M–201 551.577.37(756)

*Smallwood, Charles, Jr. (*North Carolina State College*), **Rainfall intensity-frequencies in North Carolina.** Presented at the Annual Convention of the North Carolina Sewage and Industrial Wastes

Association and the North Carolina section of the American Water Works Association, Winston Salem, N. C., Nov. 15, **1955.** 4 p. figs., 11 tables, 5 refs. **DWB** (M77.37/756 S635r)—Data for excessive rainfalls at Raleigh, Wilmington, Greensboro, Charlotte and Asheville, N. C., are tabulated in the form of frequency tables for rainfalls over 1.00, 1.25, 1.50, 1.75, 2.0, 2.5, 3.0 to 10 inches in 5, 10, 15, 20, 30, 45, 60, 80 and 120 min, respectively, and rainfall intensity-duration for a 2-year, 5-year, 10-year storm; maximum observed; Talbot's maximum, and Talbot's design storm for periods of the same duration. Constants a and b, for rainfall intensity formulas are given for the 5 stations for 2, 5, and 10 year storm, where $i = a/b + t$. Wilmington, with 10 in. per hour for 5 min. and 3 in. in 60 min has the highest constants of the 5 stations. Intensity-duration curves are also given for 2, 5 and 10 year storms for the 5 stations using records for varying periods (from 1905–54). *Subject Headings:* **1. Rainfall intensity-duration data 2. Rainfall intensity-duration frequencies 3. Design storms 4. Excessive rainfall 5. North Carolina.**—*M.R.*

10M–202 551.577.37:551.579.4(43)

Sons, Erich (*Emschergenossenschaft, Essen*), **Das Hochwasser im Emschergebiet im August 1954.** [Flood in the Emscher River region in August 1954.] *Wasserwirtschaft*, Stuttgart, 46(1):11–15, Oct. **1955.** 7 figs., 3 tables, 7 refs. **DLC**—Analysis of floods after exceptionally heavy rains (76 mm in 14 hours over catchment). Runoff amounted to 28%. Curves of rainfall and runoff versus size of catchment are shown, as well as a hydrograph and the areal distribution of the rain. Hydrostructures in the densily populated region were adequately designed. *Subject Headings:* **1. Floods 2. Excessive rainfall 3. Runoff 4. Emscher River, Germany.**—*A.A.*

10M–203 551.577.37(420)

Storm of August 6, 1952, centred over Boreham Wood. *Meteorological Magazine*, London, 81(964):302–305, Oct. **1952.** fig., photo, ref. **DWB**—A total of 4.83 in. fell NW of London, mostly in 2 hours, and 2 in. or more over a wide area in thunderstorms. Isohyets are drawn and details given. *Subject Headings:* **1. Excessive rainfall 2. England.**—*C.E.P.B.*

10M–204 551.577.37(439.1)

Szakács, Györgyné, **1952 ösze volt ötven év óta a legcsapadékosabb ősz.** [Autumn 1952, the rainiest for the last 50 years.] *Természet és Technika*, Budapest, 112(3):186, March **1953.** 4 charts, graph. **DLC**—Precipitation distribution in Hungary during the period Sept. 1, 1952–Jan. 10, 1953, is described. Charts showing precipitation distribution for that period in absolute amounts and in percentage values derived from 50-year averages (with a large area showing a value of over 25%) are presented. A major part of northeastern and eastern Hungary had more precipitation during the 4 months and ten days investigated than during six months of the wettest winter period on record for 50 years. Hungary's climate, the author explains in view of this evidence, is extremely variable. It would therefore be a serious mistake to deduce climatic trends from records of a few years' length, as is done by those who foster the erroneous belief that the plains of east Hungary are turning into desert land. *Subject Headings:* **1. Excessive rainfall 2. Hungary.**—*G.T.*

10M–205 551.577.37:551.579.4(52)

*Tachi, T., **On the heavy rainfall and flood in Sado.** *Journal of Meteorological Research*, Tokyo, 3(4):121–138, March **1951.** 23 figs., 10 tables. In Japanese, English summary p. (9). **DWB**—Frequency distribution data of days with rainfall over 50 and over 100 mm and synoptic elements associated with occurrences of heavy rainfall over a period of 36 years are presented. The relation between precipitation and the water level is shown on a curve and the monthly distribution of days with a water level giving occasion to warning given for the Kokahu, Schinano and Agano Rivers. Conclusions are drawn as to the type of cyclones which usually cause heavy rainfall and their seasonal occurence. *Subject Headings:* **1. Excessive rainfall frequencies 2. Flood frequencies 3. Water level variations 4. Synoptic climatology 5. Sado, Japan.**—*G.T.*

10M–206 551.577.37(522)

§Takahashi, K.; Asakura, T.; Hirose, M.; Ida, M. and Nakamura, N. (*Met. Res. Inst., Tokyo*), **Analysis of extraordinarily heavy rains at the end of Bai-u, one of the rainy seasons in Japan.** *Meteorological Society of Japan, Journal*, Ser. 2, 32(9/10):281–289, Sept./Oct. **1954.** 11 figs., 7 refs., 3 eqs. Japanese summary p. 281. **DWB**—Heavy rains totaling >900 mm (36″) at several stations in N. Kyushu from June 26–29, 1953, resulted in loss of 427 lives, 3303 houses and a damage of $300,000,000. H. Arakawa explained it as due to invasion of equatorial air, and T. Otani as due to a moist tongue formed by convergence of southerly winds. Vapor pressure at center of moist tongue was >20 mm and mixing ratio at 700 mb >10 g/kg. Analysis by means of vertical time and space sections, isotach analyses, trajectory charts, etc. show that air came from Sea of Japan and rain was caused by invasion of moist tongue in the jet stream at NW border of an "Ogasawara

high." Orographic effects were important. Stability of air mass also was an important factor—warm advection surface—700 mb and cold advection 500–300 mb. *Subject Headings:* **1. Excessive rainfall 2. Floods 3. Bai-u 4. Kyushu, Japan.**—*M.R.*

10M–207 551.577.37:551.579.4(522)

Takeda, Shigenochi; Endo, Taizo and Morisawa, Masao, **The relation between increased flow due to the storm and precipitation in the upstream of the Arita.** *Tokyo. Forest Experiment Station Bulletin*, No. 74:1–26, Nov. **1954.** 9 figs., 21 photos, 11 tables, map (fold.). In Japanese; English summary p. 26. **DWB**—The types of 3 heavy rainfalls brought on by the Bai-u front on July 17–18, 1953, to the southern Kinki district are discussed, disasters caused by these rains are outlined, and the average precipitation flood in the headwater area of the Arita-River (Wakayama Prefecture) is estimated. Peak flow estimated from the traces left on river banks amounted from 15 to more than 20 cu m/sec sq km in the area studied. The relation between precipitation and the increased flow is considered. The sum of the estimated maximum value of water temporarily held in the catchment area during the heavy rain and the water stored before the heavy rain amounted probably to at least 500 mm in water height. Thus, a large quantity of water penetrated into the soil more deeply than the root zone and there occurred heavy interflows resulting in a number of landslides. These are the remarkable characteristics of this flood. It might be said that landslides of this type cannot be prevented by forests. *Subject Headings:* **1. Excessive rainfall 2. Flood rainfall 3. Water level variations 4. Floods 5. Landslides 6. Arita River, Japan.**—*From authors' abstract.*

10M–208 551.577.37(52)

*Takenaga, K., **Analysis of the heavy rainfall in northern Kyushu during third decade of June 1953.** *Japan. Central Meteorological Observatory, Tokyo, Memoirs*, 38(3/4):313–333, July **1954.** 28 figs., table, 7 refs. In Japanese; legends and summary in English. **DWB**—The heavy rainfall observed at the end of June in northern Kyushu is analyzed with respect to rainfall group; the cold air pool over "Suwo-nada"; condition of cold air flux; condition of warm air flux; condition of convection and cloud; model of heavy rainfall; and effect of topography. A large-scale analysis is also made of the relation with upper strong wind; characteristics of the 300-mb height change; the pressure field and trough; and air masses. *Subject Headings:* **1. Heavy rainfall 2. Air mass analysis 3. Kyushu, Japan.**—*From author's abstract.*

10M–209 551.577.37:551.515.82(52)

§Tanaka, B.; Kasuya, M. and Suzuki, T., **Heavy rainfall over Kyushu in last decade of June 1953.** *Japan. Central Meteorological Observatory, Tokyo, Memoirs*, 38(3/4):303 312, July **1954.** 10 figs., table. In Japanese; legends and summary in English. **DWB**—The results of an investigation of a heavy rainfall observed over northern and middle Kyushu from June 25–28, 1953 are reported. During this period, a long wave trough was located over the Sea of Okhotsk and Manchuria and acted to enforce the Bai-u front in the vicinity of northern Kyushu. The heavy rainfall occurred along a weak pressure trough similar to an instability line while the trough moved down toward the south. *Subject Headings:* **1. Heavy rainfall 2. Bai-u 3. Troughs 4. Kyushu, Japan.**—*Authors' abstract.*

10M–210 551.577.37(492)

Ten Kate, H., **De regen behaalde in 1954 een record.** [The record rainfall of 1954.] *Hemel en Dampkring*, 52(12):230–231, Dec. **1954. DLC**—Total rainfall and sunshine duration figures for 1954 are discussed and compared with those of other unusually wet years of the Dutch 100-year record. The period June–Oct. 1954 was wettest on record, with 507 mm rainfall, 161 mm above normal. *Subject Headings:* **1. Record rainfall 2. Sunshine duration 3. Wet years 4. Long period records 5. Netherlands.**—*G.T.*

10M–211 551.577.37:551.515.4(411)

Thunderstorms of June 26, 1953. *Meteorological Magazine*, London, 82(977):344–347, Nov. **1953.** fig., 3 photos. **DWB**—Thunderstorms in a shallow complex low brought heavy rain in Lake District and S.W. Scotland. At Eskdalemuir fall was 3.54 in. in 55 min, 3.15 in. in 30 min, causing serious flooding. *Subject Headings:* **1. Excessive rainfall 2. Eskdalemuir, Scotland.**—*C.E.P.B.*

10M–212 551.577.37:551.509.318(439.1)

§Tónay, Mrs. Frigyes, **Az 1953. évi csapadékos nyár szinoptikai leírása.** [Synoptic account of the rainy summer 1953.] *Beszámolok az 1955-ben végzett tudományos kutatásokrol* (*Hungary. Országos Meteorológiai Intézet, Hivatalos Kiadványai*, Vol. 20, pub. **1955**). p. 91–96. 6 figs. Russian and German summaries p. 91. **DWB**—The synoptic development during the rainy period May 27–June 28, 1953, is discussed. Three stages of synoptic development within that period are distinguished (May 27–31, June 1–19 and June 22–28), the first being characterized by a monsoon situation,

the second and third by advection of unstable air masses from the southwest and northeast respectively. Rainfall charts of Hungary are presented for each of these stages. A composite chart is drawn according to MULTANOVSKIĬ's method, showing displacement of cyclones and anticyclones over Europe during the period June 1–15, 1953. *Subject Headings:* **1. Excessive rainfall 2. Synoptic conditions for rainfall 3. Hungary.**—*G.T.*

10M–213 551.577.37:551.579.4(520)

Umeda, S., **On the heavy rainfall in the middle part of Akita Prefecture on 6 August 1951.** *Journal of Meteorological Research*, Tokyo, 4(10):807–815, Feb. **1953.** 9 figs., 4 refs. In Japanese; English summary p. 49 50. **DWB**—Rain exceeding 300 mm fell over Iwaya (W. Japan, 40°N) between 10 h on 5th and 10 h on 7th Aug. causing extensive flood damage. It was due to a cold front moving SE meeting a warm front moving NE, giving strong winds and a high mixing ratio above 700 mb level. *Subject Headings:* **1. Excessive rainfall 2. Flood damage 3. Akita Prefecture, Japan.**—*C.E.P.B.*

10M–214 551.577.37:551.579.4(43)

*van Rinsum, —, **Niederschlag und Abfluss im Regnitzgebiet beim Starkregen vom 28. bis 30. Juli 1941.** [Precipitation and runoff in the Regnitz area during the heavy rain of 28–30 July 1941.] (In: Bavaria. Landestelle für Gewässerkunde, **Beitrage zur Gewässerkunde.** Munich, **1950.** p. 71–102. 37 figs., 9 tables.) **DLC** (GB732.B3A5)—Storm rainfall curves and hydrographs are presented and discussed for the storm of July 28–30, 1941, in Bavaria. The data are analyzed in a most comprehensive manner and empirical formulas and data are presented in equations, tables and graphs. *Subject Headings:* **1. Hydrometeorological studies 2. Flood-rainfall data analysis 3. Excessive rainfall 4. Runoff 5. Bavaria, Germany.**—*M.R.*

10M–215 551.577.37(94)

Vollprecht, R., **Review of papers published in Australia on the estimation of maximum possible rainfall.** (In: Australia. Bureau of Meteorology, **Conference on estimation of extreme precipitation, Melbourne, April 1958.** Melbourne, Dec. **1958.** p. 149–190. figs., tables, eqs.) **DWB**—The paper sets out in precise form the major contributions to the problem of estimating "maximum possible precipitation" in Australia. Each one is followed by a brief discussion of the main points of interest in the article, and the results obtained in different areas are summarized mainly in graphical form at the end of the paper. *Subject Headings:* **1. Maximum possible rainfall 2. Australia.**—*Author's abstract.*

10M–216 551.577.37(94)

Walpole, J., **Maximum possible rainfall over Australia.** (In: Australia. Bureau of Meteorology, **Conference on estimation of extreme precipitation, Melbourne, April 1958.** Melbourne, Dec. **1958.** p. 245–271. 23 figs., 4 tables, 2 refs.) **DWB**—The maximum dew points possible in the Australian region have been found from an examination of past records of the Australian Meteorological Service. Using methods developed by the Hydrometeorological Section of the United States Weather Bureau, the assumption is made that for the small areas and durations considered, the maximum possible rainfall intensity results from a thunderstorm in an air mass with the maximum possible surface dew point. Duration-area-depth data for thunderstorms in the U. S. are transposed to the Australian region with appropriate modifications to give generalized estimates of the maximum possible rainfall that can occur anywhere in Australia over areas varying from 10 to 500 sq mi and times ranging from 1 to 24 hours. *Subject Headings:* **1. Maximum possible rainfall 2. Australia.**—*Author's abstract.*

10M–217 551.577.37:551.515.21(52)

Yamamoto, M., **On the heavy rainfall in Wakayama Prefecture.** *Journal of Meteorological Research*, 3(6):179–186, March **1951.** 5 figs., 3 tables. In Japanese; English summary p. (13). **DWB**—The heavy rainfall associated with typhoon occurrence is discussed. The period between the first and last rain during the typhoon is related to the position of the eye of the typhoon. *Subject Headings:* **1. Heavy rainfall 2. Typhoons 3. Wakayama Prefecture, Japan.**—*I.L.D.*

10M–218 551.577.37:551.515.7(52)

Yoshica, S. and Aota, T., **On the heavy rainfall in the northern part of Akita and in Aomori Prefecture on July 21, 1951.** *Journal of Meteorological Research*, Tokyo, 4(5):194–201, Aug. **1951.** 10 figs. In Japanese; English summary p. (14–15). **DWB**—The authors analyze the heavy rainfall of July 21, 1951 from the point of view of forecasting. They point out that the rain did not occur by the collision of warm and cold air masses but was caused by the fact that the warm front moving northward from west Japan came to the converging zone in the rear of an upper small anticyclone

which did not appear on the surface maps. *Subject Headings:* **1. Heavy rainfall 2. Anticyclonic rainfall 3. Akita Perfecture, Japan 4. Aomori Prefecture, Japan.**—*Authors' abstract.*

Drought (551.577.38)

10M–219 551.**577.38**:638.1(76/77)

Barte, Walter, **Costly drought getting worse.** *Gleanings in Bee Culture*, Medina, Ohio, 82(9):542, 571, Sept. **1954.** map. Offset reproduction. **DWB**—Drought in past years is resulting in failure of honey crop as well as other crops, and increase in dust bowl. Conditions in 20 states where bees are raised are summarized state by state and a map of U. S. showing extent of drought gives picture as of August 1954. *Subject Headings:* **1. Drought, Midwestern United States (1954) 2. Bee culture 3. Midwest U. S.**—*M.R.*

10M–220 551.**577.38**:551.**509.317**(439.1)

Csizsinsky, Márta, **Az 1953, évi márciusi szárazság időjárásának leírása.** [Weather during the drought of March 1953.] *Beszámolók az 1955-ben végzett tudományos kutatásokról (Hungary. Országos Meteorológiai Intézet, Hivatalos Kiadványai*, Vol. 20, pub. *1955*). p. 58–66. 8 figs. Russian and German summaries p. 58. **DWB**—Synoptic surface and upper-air (300 mb) charts, and graphs of temperature variations at various altitudes are presented for March 1953, a cool and dry month with persistent anticyclonic circulation. In Hungary the average pressure anomaly for the month was +8.6 mm, highest on record (since 1809). *Subject Headings:* **1. Drought, Hungary (1953) 2. Upper air analysis 3. Hungary.**—*G.T.*

10M–221 **551.577.38**(778):63

Decker, Wayne L., **Chances of dry periods in Missouri.** *Missouri. Agricultural Experiment Station, Columbia, Bulletin*, No. 707, June **1958.** 11 p. 12 figs. **DWB** (M77.38 D295ch)—The results of a study on dry periods in Missouri in the last 40 years are reported. Maximum and minimum rainfall data have been obtained for the NW, NE, west central, east central, SW and the SE regions of the state. The study aims at improving the agricultural problems of the state. The longest dry periods on record at selected locations in the state are tabulated. Hannibal, in the NE part of the state, had a notable dry period of 76 days (July 6 through Sept. 19, 1947). Further research is being conducted by the Missouri Agricultural Experiment Station. *Subject Headings:* **1. Dry periods 2. Missouri**—*N.N.*

10M–222 551.**577.38**(768)

Dickson, R. R. (*State Climatologist, U. S. W. B., Nashville, Tenn.*), **1956 Agricultural drought in Tennessee.** *U. S. Weather Bureau, Weekly Weather and Crop Bulletin*, 44(3):7–8, Jan. 21, **1957.** 3 figs., 3 refs. **DWB, DLC, DA**—The center of the drought area was Milan in Gibson County. From April 1 through Oct. 31 records show a total of 16.44 in. of rainfall—12.01 below the long-term mean. From the records of precipitation and evapotranspiration, no soil moisture was available to plants by June 23. But this apparently bad year turned out to be a bountiful year in crop production. *Subject Headings:* **1. Drought, Tennessee (1956) 2. Rainfall amount 3. Tennessee.**—*N.N.*

10M–223 551.**509.318**:551.**577.38**(497.2)

Ganev, G. and Krystanov, L., **Vklad v meteorologicheskoe issledovanie zasukh v Bolgarii.** [Contribution to the meteorological investigation of droughts in Bulgaria.] *Bulgarska Akademiia na Naukite, Sofia, Doklady*, 5(1):9–12, Jan./March **1952.** German summary p. 12. **DWB**—A statistical and synoptic study of droughts in Bulgaria of a duration of at least 10 days. The number of severe droughts in the different seasons and their regional distributions in Bulgaria has been determined and the large scale synoptic weather situations associated with severe droughts are classified into types. *Subject Headings:* **1. Drought 2. Synoptic conditions for drought 3. Bulgaria.**—*I.L.D.*

10M–224 551.**577.38**(437)

Hrubes, Pavel, **O suchu v roce 1959,** [Drought in 1959.] *Meteorologické Zprávy*, Prague, 12(6): 205–209, **1959.** 5 figs., 2 tables, 9 refs. Polish, Russian and English summaries p. 205. **DWB, DLC**—The author gives a brief account of the course of the drought period from Jan.–Oct. 1959 in Czechosolovakia, deals with its causes and consequences, and shows the differences especially with regard to the distribution of precipitation in various seasons, between 1959 and 1947. *Subject Headings:* **1. Droughts 2. Czechoslovakia.**—*Author's abstract.*

10M–225 551.**577.38**:628.1(773)

Hudson, H. E., Jr. and Roberts, W. J., **1952–1955 Illinois drought with special reference to impounding reservoir design.** *Illinois. State Water Survey Division, Bulletin* No. 43, **1955.** 52 p. 50 figs., 13 tables, 43 refs. **DWB, DLC**—Water supply difficulties developed as a result of repeated

drought. Water source provinces are described, normal rainfall and runoff are presented, the components of the seasonal hydrologic cycle are estimated, and deficiencies in hydrologic data are outlined. A great number of low flow frequency curves are shown, and charts give the percentage of normal rainfall and runoff in different periods over Illinois. Finally, the requirements for reservoir storage are computed, accounting also for evaporative losses. *Subject Headings:* **1. Drought, Illinois (1952-1955) 2. Rainfall-runoff relationships 3. Evaporation 4. Water supply 5. Illinois.**—*A.A.*

10M-226 551.577.38:551.509.3(439.1)

Kakas, József, **Az 1953. évi márciusi szárazság Magyarországon.** [Drought in Hungary in March 1953.] *Időjárás*, Budapest, 59(3):153-164, May/June **1955.** 16 figs., 12 refs. Russian and French summaries p. 153. **DWB, DLC**—One of the peculiarities of the climate of Hungary is the scarcity of precipitation in late winter and early spring. If precipitation over Europe is generally deficient at the same time, extreme drought develops in the Carpathian basin as a consequence of its enclosed situation. A detailed synoptic climatological study is presented of the unusual drought in the early spring of 1953 which provides evidence in support of the above theory. *Subject Headings:* **1. Drought, Hungary (1953) 2. Synoptic studies 3. Hungary.**—*Transl. of author's abstract.*

10M-227 551.577.38(68)

King, J. A. and van Loon, H., **Weather of the 1957 and 1958 winters in South Africa.** *South African Geographical Journal*, Johannesburg, 40:62-67, Dec. **1958.** 6 figs. **DWB**—In July-September 1957, the rainfall was excessive in South Africa, but in June-August, 1958, the rainfall was almost nil in the Plateau region of Transvaal and vicinity. In the coastal areas of Natal the winter rainfall in 1958 was only 14% of normal. Mean surface, upper air and anomaly pressure and wind charts show little variation from normal, but this may be due to the fact that even in a normal winter rain falls on only 3 or 4 days, so a winter with only one or no days with rain would not appear much different on mean charts. Mean temperatures, however, are shown to be considerably above normal over the whole area. No major outbreaks of polar air were noted on the daily charts for July 1958; also it is shown that mean sea level pressure is anomalously high to the south of the Cape during periods when rain occurred in 1957, even though such anomalies do not affect monthly mean anomalies. *Subject Headings:* **1. Dry spells 2. South Africa.**—*M.R.*

10M-228 551.577.38(410)

Low rainfall of January-March. *Institution of Water Engineers, London, Journal*, 7(3): 293-294, May **1953.** table. **DWB**—Monthly rainfall totals for Jan.-March 1953 (England-Wales and Scotland) are indicated and briefly commented on. Totals for the three-month period (England-Wales 4.7 in., Scotland 7.5 in.) were lowest for that period since 1869 (excluding the record low in 1929). Seven places with dry periods (0.1 in. or less) of 40-42 days' duration between Feb. 13 and March 27 are listed. Special preparedness for hydrological measurements is recommended in view of the expected unusually low flows. *Subject Headings:* **1. Dry spells 2. Great Britain.**—*G.T.*

10M-229 551.577.38(73)

McQuigg, James (*U. S. W. B. Omaha*), **The 1954 drought.** *Weatherwise*, 8(1):22-24, 30, Feb. **1955.** 10 figs. **DWB**—The atmospheric circulation associated with the 1954 drought in the U. S. is described with the aid of charts of precipitation, temperature and of percentage of normal streamflow. *Subject Headings:* **1. Drought, United States (1954) 2. Atmospheric circulation 3. United States.**—*I.L.D.*

10M-230 551.577.38:551.577.32(45)

*Mennella, Cristofaro, **Andamenti pluviometrici eccezionali sul versante Tirrenco della penisola Italiana: andamento di carenza del semestre invernale.** [Unusual rainfall variations on the Tyrrenian slope of the Italian Peninsula: variation of rainfall deficiency during winter.] *Geofisica e Meteorologia*, Genoa, 3(3):41-57, May/June **1955.** 40 tables, 5 refs. **DWB**—On the basis of over a hundred years of rainfall data for Florence, Perugia, Rome and Naples, the author analyzes the annual and winter rainfall with special reference to dry and exceptionally dry winters. Statistical data are given for the monthly rainfall at each of the above stations for the winters selected. This analysis is extended to the dry winters over a period of 130 years for various stations on the Tyrrhenian slope of the Italian peninsula. *Subject Headings:* **1. Drought 2. Winter rainfall 3. Italy.**—*I.L.D.*

10M-231 551.577.38(437)

Mikulski, Zdzisław, **Wyniki dyskuskji na temat suszy w 1947 r. w Czechosłowacji.** [Discussion on drought of 1947 in Czechoslovakia.] *Przeglad Meteorologiczny i Hydrologiczny, Rocznik*, 5(3/4): 123-135, **1952.** 6 refs. **DWB**—After having given a general climatological and hydrological analysis of the drought, the author presents a review of reports made by specialists on the causes of droughts and measures of fighting them. The following questions were discussed: the origin of drought; the

attitude of conservers and farmers in the struggle against drought; and the importance of the water balance in drought prevention. *Subject Headings:* **1. Drought, Czechoslovakia (1947) 2. Drought prevention 3. Soil conservation 4. Czechoslovakia.**—*A.M.P.*

10M–232 551.577.38:551.513.7(73)

Namias, Jerome (*U. S. Weather Bureau, Wash., D. C.*), **Some meteorological aspects of drought, with special reference to the summers of 1952–54 over the United States.** *Monthly Weather Review*, 83(9):199–205, Sept. **1955.** 9 figs., 6 refs. **DWB**—The problem of drought is examined as a manifestation of anomalous patterns of the atmosphere's general circulation. Special consideration is given to the quasi-stationary planetary wave ensembles which are responsible for extensive summertime drought over the United States. The critical importance of the great Atlantic and Pacific anticyclones for encouraging or discouraging the development of the great North American upper level anticyclone, the immediate drought producing cell, is emphasized. *Subject Headings:* **1. Drought 2. Drought forecasting 3. Atmospheric circulation anomalies 4. United States.**—*Author's abstract.*

10M–233 551.577.38(74)

Palmer, Wayne C. (*Off. of Climatology, U. S. W. B.*), **Drought in 1957.** *Weatherwise*, Boston, 11(1):23–25, 36, Feb. **1958.** 2 refs. **DWB**—Drought began in mid-April, was the most extensive in June and July and declined in late Aug. Many Weather Bureau stations reported new record low rainfalls especially in the NE part of the U. S. A. Maps show percentage of normal precipitation for 4 weeks ending 12 May, 16 weeks ending 28 July; June–Aug.; and Sept.–Nov. 1957, respectively, and pasture feed conditions on 1 May and 1 Aug. 1957 for U. S. A. The drought which affected the Great Plains had diminished in area by 1 Aug.—that in the Middle Atlantic States increased. *Subject Headings:* **1. Drought, United States (1957) 2. Middle Atlantic States.**—*M.R.*

10M–234 551.509.318:551.577.38(437.1)

Rein, František (*Geofys. ústav ČSAV, odd. klimat.*), **Suchá období na Milešovce.** [Dry periods at Milešovka.] *Meteorologické Zprávy*, Prague, 11(6):125–130, **1958.** 4 figs., 4 tables, 7 refs. Russian summary, p. 125. **DWB, DLC**—Data on dry periods (at least 5 consecutive days without precipitation) at Milešovka are presented for 1946–1955, as well as on sunshine, cloudiness, temperature, horizontal precipitation, fog, strong wind and thunderstorms during these dry periods. Conditions of sunshine and cloudiness are also examined for two synoptic types causing dry periods. *Subject Headings:* **1. Dry periods 2. Synoptic conditions for drought 3. Milešovka, Czechoslovakia.** —*Transl. of author's abstract.*

10M–235 551.577.38:551.573:(66)

Stebbing, E. P., **Forests, aridity and deserts.** (In: Institute of Biology, London, **Biology of deserts.** London, **1954.** p. 123–128.) **DWB**—The creation of deserts by man's activity in particular that of shifting cultivation is discussed with special reference to West Africa. Various causes of desiccation, the nature of drought, including a discussion of the period when desiccation begins to become seriously apparent, namely "intermittent rainfall," the nature of desiccation in America, Southern Australia, and the prospects for the expansion of man-made deserts are considered. *Subject Headings:* **1. Desiccation 2. Drought 3. West Africa.**—*I.L.D.*

10M–236 551.577.38(4)

Stuchlík, František, **Bude rok 1953 ve střední Evropě katastrofálně suchý?** [Is 1953 to be a disastrously dry year in Central Europe?] *Meteorologické Zprávy*, Prague, 5(6):158–159, **1952.** 7 refs. German and Russian summaries p. 158. **DLC**—Two different periodicities appear to suggest a dry summer for 1953, one being caused by monsoonal circulation over Europe at the time of maximum and minimum sunspot occurrence, the other being a six-year periodicity of subnormal precipitation possibly resulting from axial oscillations of the earth. The six-year cycle of rainfall deficiency may be observed in the records of several Central European stations. *Subject Headings:* **1. Drought periodicities 2. Central Europe.**—*G.T.*

10M–237 551.577.38(768)

*Tennessee Valley Authority, **Occurrence of drought in the Tennessee Valley.** Its *Report* No. T-58-2 AE, June **1958.** 58 p. 7 plates, numerous tables. **DWB** (M77.38 T297oc)—This report is a coverage on the details of that investigation which is based on the broad analysis of 30 years of climatic records for selected stations located throughout the valley. The results of the 1927–1956 drought study indicate that an average of 25.04 in. and 25.51 in. of rainfall have been recorded for the eastern and western parts of Chattanooga, respectively, during various drought days on a 1-, 3-, and 6-in. basis. Drought day determinations were derived for 1-, 2-, 3-, 4-, and 6-in. levels of moisture capacity and are considered adequate to cover the available moisture holding capacity of nearly all soil and drop combinations found within the Tennessee Valley. The data show that by increasing

the capacity of the soil to hold moisture, the number of drought days may be sharply decreased. *Subject Headings:* **1. Drought days 2. Drought prevention 3. Tennessee Valley.**—*N.N.*

10M–238 551.577.38:551.455

Tulaĭkov, N. M., **Bor'ba s zasukhoĭ.** [Drought prevention.] (In: Vsesoiuznia Akademiia Sel'skokhoziaĭstvennykh Nauk, **Sel'skokhoziaĭstvennaia nauka v SSSR.** Ed. by A. S. Bondarenko. Moscow, **1934.** p. 149–159. **DLC** (5241.V82)—Discussion of the results and achievements in agriculture of the Soviet Government during the past 16 yrs, and on the plans and problems for the future. First, the causes of drought must be analyzed. According to the new theories the air which brings about drought in the steppe originates in the Arctic Ocean. A great number of meteorological stations are now being established in the Arctic which will enable one to discover the laws governing the movement of the cold air masses. The effectiveness of forest shelter belts, artificial precipitation and water pond layout in prevention of drought effects on the adjoining fields must be studied as well as the methods for increasing the soil moisture, snow retention, soil mulching, etc. It is pointed out that in some steppe regions no precipitation was observed from the 20th of April to the end of June, 1933 (60 days). Under such conditions, only irrigation can help. For this purpose huge water reservoirs are being built on the steppe and the scientists will have to solve the problem as to what extent these newly created water surfaces will influence the climate of the adjoining land. *Subject Headings:* **1. Drought prevention 2. Steppe climates 3. U.S.S.R.**—*N. A. Zikeev.*

10M–239 551.577.38(73)

U. S. Special Assistant to the President for Public Works Planning, **Drouth: a report.** Issued Oct. **1958.** 47 p. 13 fig., tables. **DWB** (M77.38 U5853dr)—A general survey of the drought problems in 16 states of the U. S. is made. There has been a steady increase in the economic, agricultural, and social evaluation of the problem since 1940. The greatest areas of the deficiency lie between the Rockies and the Mississippi River. Records show southwestern Texas and south central Kansas as areas most affected. Steps taken by the Federal Government are enumerated. *Subject Headings:* **1. Drought 2. United States.**—*N.N.*

10M–240 551.577.38(73)

*U. S. Weather Bureau, **Five drought years in the Southwest.** (Back of Daily Weather Map, Jan. 18, **1957.**) entirely charts. **DWB**—Eight maps of SW states show normal annual precipitation, number of months with below normal precipitation for 5 years (1952–6) and percent of normal precipitation for the 5 years and for each separate year 1952–6. Large areas of Texas, New Mex., Okla., Nebr. and Mo., and most of Kansas had $<75\%$ for the 5 years, and >45 months out of 60 below normal. Some areas of Texas had >50 out of 60 months below normal. *Subject Headings:* **1. Drought, Southwestern United States (1952–6) 2. Precipitation anomalies 3. Southwestern United States.**—*M.R.*

10M–241 551.577.38:633.51(76)

Weather for 1955. Sure to be better is safe prediction. *Cotton Gin and Oil Mill Press*, Dallas, Texas, 56(2):27–28, Jan. 15, **1955. DWB**—Dallas had 4th consecutive year of drought in 1954 (one of the 8 major drought years in the past 600 years, according to A. N. Sayre of the U. S. Geological Survey). Rainfall was 8 in. below normal (1953, 9 in.; 1952, 6 in.; and 1951, 6 in. below normal), making a total deficiency of 29 in. or 20% in 4 years. In Alabama only 50% of normal rainfall in 1954—driest on record. Other southern states had similar record drought and heat in spite of which the cotton crop was biggest on record. *Subject Headings:* **1. Drought, Southern United States (1954) 2. Cotton crop yields 3. Southern states.**—*M.R.*

VARIOUS INFLUENCES ON PRECIPITATION (551.577.5)

10M–242 551.577.52:551.585.5

Glover, Sir Harold, **Some aspects of dry-zone forestry.** (In: International Symposium on Desert Research, Jerusalem, May 7–14, 1952, **Proceedings,** p. 259–265, pub. **1953.**) **DWB**—The author considers briefly the relationship between amount and distribution of rainfall and forest type, discusses restoration of forests in Cyprus and in the Levant and the use of windbreaks in the Levant, and describes the ecology and restoration of the Cedrus Deodora forests in the dry zone of the Himalayas, the plains forests of the Punjab, the olive forests of Northwest Punjab, etc. *Subject Headings:* **1. Forest rainfall 2. Forest ecology 3. Arid zones.**—*I.L.D.*

10M–243 551.577.2:551.577.51(43)

Kauf, Helmut (*Jena*), **Die Einwirkung der Orographie des mittleren Saaletales auf die Niederschlagsverteilung. Teil I, Mittlere Niederschlagsverhältnisse in der Umgebung von Jena.** [The

orographic influence on precipitation distribution in Saale Valley. Pt. 1, Mean precipitation conditions in the Jena region.] *Weimar. Thüringische Landeswetterwarte, Mitteilungen*, No. 8:29–58, **1949.** 10 figs., 14 tables, 7 refs. **DLC**—An attempt to study local orographic influences on precipitation distribution, discussing increase with height, influence of mountain ranges, drought and precipitation periods, and dependence on weather situations. Furthermore, singularities in temperature changes, precipitation amounts, days with thunderstorm and precipitation are analyzed for Jena (1895–1944) and compared with other regions in Germany, without making any significance tests. *Subject Headings:* **1. Precipitation distribution 2. Orographic influences 3. Singularities 4. Jena, Germany.**—*A.A.*

10M–244 551.577.52

Konstantinov, A. R., **K voprosu o vliianii na atmosfernye osadki kompleksa meropriiatii po preobrazvaniiu prirody.** [The influence of the many methods of transforming nature on atmospheric precipitation.] *Meteorologiia i Gidrologiia*, Moscow, No. 8:7–12, **1952.** 2 figs., 8 refs. **DLC**—The influence of forests on precipitation was indicated by A. I. Voeikov, who noticed that even small forests can increase the precipitation amount up to 12–27%. This phenomenon was discussed in the last years by G. P. Kalinin and S. I. Kostin. The principles of calculation proposed by Kalinin are satisfactory, but smoothing the roughness factor of forest belts to the factor of roughness of the forest border is incorrect. Experiments made in Aug. 1950 over Kamennaia Step' from an airplane confirmed that the forest belts caused an increase in turbulent exchange of air up to a height of 500 m, and rising currents were discovered at 500–1500 m from the broder of the forest belt region. On the basis of works by Budyko and Drozdov, the author calculated the probable values of the local increase in precipitation and found that the values should be about 17 mm per summer. Predominance of westerly air currents in the regions causes an increase of precipitation for the western part of the afforested territory up to 25 mm, and about 10 mm for the eastern part. It is believed that after all the afforestation work is completed, the annual increase of precipitation will be about 45–50 mm in the western part of the territory and about 10–15 mm in the eastern part. *Subject Headings:* **1. Precipitation 2. Forest influences on precipitation 3. Forest belts 4. Afforestation.**—*N. T. Zikeev.*

10M–245 551.577.2(438) 551.577.52

*Paszyński, Janusz, **Opady atmosferyczne dorzecza Odry i ich związek z zalesieniem.** [The precipitation of the Oder basin and its relationship to afforestation.] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, 6(1/2):30–46, **1953.** 4 figs., 5 tables, 10 refs. English summary p. 46. **DWB**—Results of a detailed study of the interrelation between the degree of afforestation, the yearly amount of precipitation and its distribution during the year in the lower part (under 200 m. altitude) of the Oder River Basin, based on mean monthly and yearly data of 512 observation stations for the period 1891–1930 are presented and discussed. After having eliminated the influence of different altitudes by reducing all precipitation data to sea level, the author analyzes the amplitude and yearly course of precipitation and its dependence on altitude and degree of afforestation. It has been found that an increase of 10% in afforestation augments the annual precipitation by 16 mm., which corresponds to an altitude difference of about 20 m. Afforestation increases the amount of precipitation in the winter period, and its influence in winter is 3 times greater than in summer. The relationship subsists when the afforested area does not exceed 50% of the whole territory in consideration. *Subject Headings:* **1. Precipitation distribution 2. Forest influences on precipitation 3. Long period records 4. Oder River Basin.**—*A.M.P.*

RADIOACTIVITY OF PRECIPITATION (551.577.7)

10M–246 551.577.7

Köhle, H., **Recherches et expériences sur le problème des substances radio-actives contenues dans l'eau.** [Studies and experiments on the problem of the radioactive materials contained in water.] *Centre Belge d'Etude et de Documentation des Eaux, Liége, Bulletin* No. 40(2):124–133, **1958.** 10 figs. 3 tables, 11 refs. **DLC**—The author deals successively with: the dangers of contamination subsequent to the use of water in the nuclear processes, the apparatuses and methods to determine the intensity of the radioactivity in water, the determination of the radioactivity in atmospheric precipitation, and studies concerned with the cleansing of radioactive waste waters. *Subject Headings:* **1. Radioactivity of water 2. Radioactivity of precipitation.**—*A.V.*

10M–247 551.577.7:551.521.64

Thor, Rama and Zutski, P. K., **Annual deposition of cosmic ray produced Be^7 at equatorial latitudes.** *Tellus*, Stockholm, 10(1):99–103, Feb. **1958.** 4 tables, 10 refs. **DWB, DLC**—The concentration of cosmic ray produced Be_7 in rain water has been measured at two stations in the

quatorial latitudes. Its rate of deposition at the earth's surface has been estimated to be about 0×10^5 atoms $cm^{-2}yr^{-1}$ and the deposited quantity seems to be independent of latitude. *Subject headings:* **1. Cosmic ray isotope production 2. Radioactivity of rainwater 3. Isotope content of air 4. Beryllium^7.**—*Authors' abstract.*

SPECIFIC FORMS OF PRECIPITATION (551.578)

RAIN (551.578.11)

10M–248 551.578.11:551.576.1(213)

Ackerman, Bernice, **Buoyancy acceleration and precipitation formation in tropical cumuli.** hicago. Univ. Dept. of Meteorology, Contract AF 19(604)-618, Cloud Physics Research, Technical ote no. 2, Aug. 31, 1955. 30 p. 11 figs., 8 tables, 9 refs. **DWB**—Observations made in and around ropical cumuli in the vicinity of Puerto Rico during the winter of 1953–1954 and the month of ctober, 1954 were used to determine the presence of precipitation and to obtain estimates of cloud uoyancy. The relationship between cloud buoyancy and the development of rain, as well as the nportance of environmental conditions in the precipitation process, are discussed. In addition, an valuation of the effects of treating clouds with a water spray is made through the use of the buoyancy-recipitation relationships observed in untreated clouds. *Subject Headings:* **1. Cloud buoyancy . Tropical clouds 3. Precipitation formation 4. Puerto Rico.**—*Author's abstract.*

10M–249 551.578.11:551.573

Britaev, A. S., **Nestatsionarnoe temperaturnoe pole kapli zhidkosti.** [Unstable temperature eld of a liquid drop.] *Moscow. Tsentral'naia Aerologicheskaia Observatoriia, Trudy*, No. 17:1–14, 956. 15 refs., 5 figs., 21 eqs. **DLC**—The temperature regime of water drops in an air stream aturated with water is investigated. Equations are developed to show that under conditions of apid variation in the temperature of drops or in the temperature of surrounding atmosphere the ifference between the drops and the atmosphere, and hence also the magnitude of the temperature radient within the drop, depends on time and attains a considerable value. The temperature of ater drops (other than monodisperse aerosols) is determined by heat conductivity, and evaporation s calculated. It is shown that the magnitude of the specific force of the heat source of a drop is quivalent to the amount of heating or cooling or (correspondingly) the magnitude of the specific ntensities of "heat flow" during evaporation. *Subject Headings:* **1. Drop temperature variations . Evaporation of droplets.**—*I.L.D.*

10M—250 551.506.7:551.508.822:551.578.11(52)

Ohtake, Tekeshi (*Geophys, Inst., Tohoku Univ.*), **Investigation of warm rain based on radiosonde ounding data.** *Tohoku Univ., Science Reports, 5th Ser., Geophysics*, 11(2):112–131, Sept. **1959.** 11 figs., 4 tables, 6 refs. **DWB, DLC**—On the basis of aerological data provided by radiosonde oundings, criteria for warm rainfalls were set up, then monthly frequencies of warm rain in Japan t 12 stations during the period of 1 year were examined. In the northern parts warm rainfalls rom stratiform clouds were observed in summer, and in the southern parts from convection clouds hroughout the year. The thinnest cloud for warm rain was 300 m in thickness. Synoptic examina-ion of individual warm rainfalls revealed that warm rain was most frequently observed near a small epresssion and sometimes in front and in the rear of a tropical cyclone. The latest flight test was lso examined. *Subject Headings:* **1. Radiosonde data 2. Warm-cloud rainfall 3. Japan.**—*Author's abstract.*

10M–251 551.578.11

Okita, Toshiichi (*Geophysical Inst., Hokkaido Gakugei Univ.*), **Observations of vertical change of raindrop size distribution.** *Tohoku University, Science Reports, 5th Ser., Geophysics*, 10(1):1–14, July **1958.** 13 figs., table, 9 refs., 7 eqs. **DWB, DLC**—The simultaneous observations of raindrop size distributions made at three stations of different heights on the slope of Mt. Kuro revealed that numerous small raindrops were present near the cloud base but their number decreased considerably within several hundred meters below the base. The modification of size distribution by mutual coalescence and by evaporation below the cloud base is calculated. If several assumptions regarding the size distribution near the cloud base, air flow and temperature and humidity profile in the free atmosphere are granted, fairly good agreement is found between the calculated and observed variation of distribution. *Subject Heading:* **1. Raindrop size distribution.**—*Author's abstract.*

10M–252 551.578.11:551.574.1

Tank, William G., **Surface agent distribution resulting from a cloud of falling droplets.** *U. S. Dugway Proving Ground, Utah, DPGRR*, No. 110, Jan. **1957.** 47 p. 9 figs., 70 eqs. **DWB**—

Equations are derived for the surface agent distribution resulting from a cloud of falling droplet The derivation is accomplished by consideration of the trajectories of minute particles which ha terminal velocities as determined by Stokes' Law and which are injected into an atmosphere exhibiti a power-law velocity profile. Time is eliminated as a variable, and surface agent distribution equ tions are presented in which the amount of agent is the dependent variable and the x and y-coordinat are the independent variables. Several examples of application are presented and the results a discussed. The assumptions necessary for the application of the method and their relative impo tance are mentioned. The limitations of the method are also discussed. *Subject Headings:* **1. Dro trajectories 2. Drop velocities.**—*Author's abstract.*

SNOW (551.578.4)

10M–253 551.501.9:551.578.4(54) 551.578.46(5

*India. Meteorological Dept., **Observations of Himalayan snowfall and snow-cover made b the India Meteorological Department.** *International Union of Geodesy and Geophysics, Associatio of Scientific Hydrology, Oslo, 1948,* [*Transactions*], 2:109–114, [1951] fig., 5 tables, 2 refs. **DWB–** Since 1875 India has been interested in snowfall and snow cover the Himalayas. A list of 15 ra and snowfall measuring stations from 3965 to 11,529 ft is presented and the year of establishmen (1867–1949) of each is given. Use of snow observations in India for forecasting water supply, an projects for improving snow observations and surveys in the Himalayas are stated together wit departures of snowfall and May 31 snow cover for each year (1876–1947) and precipitation for eac month in several basins. *Subject Headings:* **1. Snowfall 2. Snow cover 3. Snow melt runo 4. Himalayas 5. India.**—*M.R.*

10M–254 551.578.4:061.2 551.578.4

Kirigin, B. (*Zagreb*), **Institut za ispitivanje snijega i lavina na Weissfluhjochu, iznad Davos 2660 m.** [The Institute for Snow and Avalanche Research on the Weissfluhjoch near Davo 2660 m.] *Yugoslavia. Hidrometeorološka Služba, Vesnik,* 2(1):8–10, Jan./March **1953. DWB–** After describing the research facilities available at the "Eidenössisches Institut für Schnee- un Lawinenforschung" and outlining the Institute's activities, the author states the desirability of th establishment of a similar institute (on a smaller scale at first) in Yugoslavia. *Subject Headings* **1. Research institutes 2. Snow research 3. Avalanche research.**—*G.T.*

10M–255 551.578.4:061.

Nakaya, Ukichiro, **International Commission on Snow and Ice.** *Seppyo* (*Snow and Ice*) Tokyo, 12(1):198–200, **1950.** In Japanese. **DWB**—Summary of recent work of Internationa Commission of Snow and Ice; Snow and Glaciers; A. G. U., Association of Meteorology; Wester Snow Conference, etc. *Subject Heading:* **1. International Commission on Snow and Ice.**—*M.R.*

Structure Of Snow And Ice Crystals (551.578.41)

10M–256 551.578.4

de Quervain, M. R. (*Swiss Snow and Avalanche Res. Inst., Weissfluhjoch, Davos*), **Snow classi fication.** *International Union of Geodesy and Geophysics. Assoc. of Scientific Hydrology, Toronto Sept. 1957,* [*Transactions*], 4, pub. **1958.** p. 383. **DWB, DLC**—It is remainded that at the Osl congress 1948 the need for a standard snow classification was urged. At the Brussels congres 1951 a draft classification was presented by a three man committee and adopted by the commissio of snow and ice, provided that this classification would be approved by the World Meteorologica Organization. In the negotiations with WMO certain discrepancies were established. It appeare that WMO also was revising the terminology of precipitation (part of the cloud atlas). In 1956 th author of this note was designated by the Association of Hydrology to discuss the two classification in question with a representative of WMO (Prof. Bleeker) in order to get them adjusted. Th result of a conference held in Geneva has been communicated to the Secretary of the Association Hydrology and the President of the Commission of snow and ice. It is suggested to bring it befo the commission for final approval. *Subject Heading:* **1. Snow classification.**

10M–257 551.578.4

Itoo, Kyoji, **Some remarks on the International Classification of Snow.** *Seppyo* (Snow and Ice Tokyo, 13(5):9–10, **1952.** In Japanese. Also his **Further remarks on the International Classifica tion of Snow.** *Seppyo* (*Snow and Ice*), Tokyo, 14(1):32–33, **1952. DLC** *Subject Heading:* **1. Sno classification.**

10M–258 551.578.4

Itoo, K., (*Met. Res. Inst.*), **"Diamond Dust" of an unusual crystal form.** *Papers in Meteorolo and Geophysics,* Tokyo, 8(3):215–221, Oct. **1957.** 16 figs. (incl. photos), 4 refs. English summa

215; Japanese summary p. 221. **DWB**—The author observed "Diamond Dust" or ice crystals in the air of an unusual crystal form at Hailar (49°13'N, 119°44'E, 619 M height). Some microphotographs of these crystal forms are shown in Figures 1, 2, . . . and 15. *Subject Headings:* **1. Ice crystal forms 2. Hailar, Manchuria.**—*Author's abstract.*

10M–259 551.578.41(520)

Itoo, Kyoji; Yano, Tadashi and Hama, Koichi, **On the distribution of size of rimed snow flakes.** *Researches on Snow and Ice*, Tokyo, No. 1:13–18, Nov. **1953.** 8 figs., 3 refs. In Japanese. **DWB**—The size distribution of rimed snowflakes has a mode at about 0.5∼0.7 mm in diameter (reduced to water drops). The distribution of fall velocity of rimed snow flakes has a mode at about 60∼80 cm/sec. Observations were made at Nagano Prefecture in Central Japan. *Subject Headings:* **1. Snowflake size distribution 2. Japan.**—*H. Arakawa.*

10M–260 551.578.41 551.322:548.54

Kobayashi, T. (*Inst. of Low Temp. Science, Hokkaido Univ.*), **On the habit of snow crystals artificially produced at low pressures.** *Meteorological Society of Japan, Tokyo, Journal, Ser. II*, 36(5):193–208, Oct. **1958.** 14 figs., 20 photos, 20 refs. **DWB, DLC**—A series of artificial snow-making experiments were carried out in the air at low pressures, and the relation between crystal forms and ambient temperature and pressure as represented by the Ta-p diagram (Fig. 9) was established. It was found that solid-hexagonal columns are formed at pressures lower than 70 mm Hg, which is to be attributed to the slow rate of growth, that is, very slight supersaturation of the ambient vapour. The mode of growth at low pressure may probably be considered to have the same characteristics as the growth under quasi-equilibrium condition. By the aid of the results obtained from the present and previous experiments, we obtain a workable scheme as to the snow crystal habit. *Subject Headings:* **1. Artificial snow crystals 2. Snow crystal structure.**—*Author's abstract.*

10M–261 551.578.41:551.574.12

Kuroiwa, Daisuke, **Growth of snow crystals in supercooled cloud: on the role of minute water droplets.** *Low Temperature Science, Ser. A, Physical Sciences, Sapporo*, Japan, 14:1–13, **1955.** figs., 11 refs., 12 eqs. In Japanese, English summary p. 12–13. **DWB, DLC.** Translation into English by E. R. Hope, issued as *Canada. Defence Research Board*, Translation T 58 J, Dec. **1956.** p. 8 figs., etc. **DWB**—Kumai and Nakaya have advanced the opinion that the growth of snow crystals in the atmosphere is largely promoted by minute water droplets 1∼2μ in diameter that directly come in contact with the crystal surface. Kampe, Weickmann, etc., on the other hand, maintain the view that, since such minute water droplets will be evaporated within a small fraction of a second (∼1/100 sec) owing to the difference between the vapor density over ice and that of supercooled water droplet, the contribution to the crystal growth of the droplets as they are in the liquid state is inconceivable. It is true that when the relative velocity between the snow crystal and the water droplet is zero or extremely small, the droplet will be evaporated instantly, but, in case relative velocity is sufficiently large, the diffusion field windward will be contracted so that there occurs the possibility that the droplet will come into collision with the crystal without being completely evaporated. By calculating the amount of evaporation of the droplet in such a case, the author deduced therefrom the equivalent radius Ae of a virtual droplet that would have the same mass as the total amount of evaporation, and by comparing this with the original droplet radius A_{00}, he determined the conditions under which the droplet passing through the diffusion field will or will not completely be evaporated. The result indicates that when the fall velocity of the crystal u_0 is 20∼30 cm/sec, a droplet 1∼2μ in diameter can arrive upon the crystal surface without complete evaporation, even at −12°C when the vapor pressure difference between ice and water $(c_i - c_w)$ reaches a maximum. The equivalent radius Ae as a function of u_0 and $C_i - C_w$ is given by

$$Ae^2 = \frac{D(c_i - c_w)}{\rho u_0}\left[(2+a')\{-E_i(-a')\} - a'^2\{-E_i(-a')\} + a'e^{-a'}\right],$$

where D = diffusion coefficient of water vapor, ρ = density of water, u_0 = falling velocity of snow crystal, $a' = (u_0 A/D)$ (A = radius of snow crystal), $\{-E_i - a')\}$ = logarithmic integral. *Subject Headings:* **1. Snow crystal growth 2. Evaporation of droplets.**—*Author's abstract.*

10M–262 551.578.11:551.578.41

Magono, Choji, **On the growth of snow flake and graupel.** *Yokohama, Japan. National Univ., Science Reports, Sec. 1*, No. 2:18–40, **1953.** 41 p. 17 figs., 5 tables, 13 refs., 14 eqs. **DWB** (M79.41 M211on)—It is considered that the aggregation of snow crystals to form snow flakes and the collision of supercooled cloud particles with graupel are the principal mechanisms for the formation of rain drops of the customarily observed size. Some measurements show that the fall velocity of large snow flakes is larger than that of single snow crystals of the same crystal type as the snow flakes, and

has scarcely any relation with their sizes. It appears that snow flakes do not grow by the mutu collision between snow crystals or by the snow flakes, but by the collision of snow flakes with sno crystals as a result of their different fall velocities. Quantitative estimations for the rate of grow of snowflakes by the collision process were made, and it was found that a sizeable rain drop may produced from a snow flake. Some considerations for the formation of graupel were made. *Subj Headings:* **1. Snow crystal growth 2. Graupel 3. Rain-drop formation.**—*Author's abstract.*

10M–263 551.578.41 551.322:548.

Mason, B. J. (*Warren Res. Fellow of the Royal Soc., Imperial College, London*), **The growth ice crystals from the vapour and the melt.** *Advances in Physics*, London, 7(26):235–253, April 195 15 figs., 3 tables, 28 refs., 7 eqs. **DWB**—This review is concerned with recent program in relati the shape, structure and growth rate of ice crystals to the environmental conditions in which they a formed; in particular graphs dealing with the occurrence of crystals in natural clouds, laborato studies of ice crystal growth, the growth rate, influence of fall motion, influence of aerosols and foreig vapors, expitaxy of ice on foreign substances and crystal growth from the melt. The studies reviewe are found to have revealed the growth mechanisms of ice crystals to be very complicated, with mar puzzling features which are apparently peculiar to ice. *Subject Headings:* **1. Ice crystal growt 2. Ice mechanics.**—*G.T.*

10M–264 551.578.41:778.1

Nakaya, Ukichiro (*Hokkaido Univ., Japan*), **Physical investigations of snow flakes.** *Conferen on the Physics of Cloud and Precipitation Particles, [First] Sept. 1955, Proceedings.* pub. N. Y Pergamon Press, **1957.** p. 327–331. 8 figs., eqs. **DLC** (QC921.5.U5) **DWB**—Shadow photograph and its application to the study of snowflakes and nature of snowflakes are discussed and illustrate The method, developed by K. Higuchi, involves the use of a dark box without a lens, and with glass plate covered with snow crystals placed on a piece of photographic paper. The plate is illum nated briefly from above. Then the crystals are melted and a picture taken of the droplets to obtai the mass distribution of water. C. Magono photographed many snow flakes while falling an after falling on a glass plate in winter of 1951–4 in Japan. Types of flakes and aerodynamic resistanc while falling are discussed on the basis of these photographs. *Subject Headings:* **1. Shadow photog raphy of snowflakes 2. Snow crystal structure. I. Higuchi, K. II. Magono, C.**—*M.R.*

10M–265 551.578.4

Nakaya, Ukichiro (*Hokkaido Univ., Japan*), **Surface nature of ice crystals.** *Conference on th Physics of Cloud and Precipitation Particles, [First] Sept. 1955, Proceedings.* pub. N. Y. Pergamon Press, **1957.** p. 386–389. 9 figs. **DLC** (QC921.5.U5)—Microphotographs of polyvinyl forma replicas of ice crystals show etch pits with geometrical shape on the ice surface. The pits show form similar to a section formed by the intersection of a hexagonal column with a plane. The botto of the etch pit eventually becomes a plane parallel to the base plane and then a stepped structur develops whose height was found to be 3–6μ (by use of electron microscope). These experiment were due to K. Higuchi at Hokkaido University. Thermal etch pits of snow crystals were mad (with natural and artificial snow crystals) by M. Kumai at Hokkaido University. *Subject Headings* **1. Snow crystal structure 2. Snow crystal replicas. I. Higuchi, K. II. Kumai, M.**—*M.R.*

10M–266 551.578.41

Nakaya, Ukichiro, **Tentative snow classification.** *Seppyo (Snow and Ice)*, Tokyo, 12(1) 200–206, **1950.** tables. In Japanese. **DWB**—Table gives classifications recommended by Inter national Commission of Snow and Ice and text explains various systems. *Subject Headings:* **1. Snow classification 2. International Commission on Snow and Ice.**—*M.R.*

10M–267 551.578.41

Shoda, Mikio, **Report of work done during winter 1949/1950 at Shiozawa Laboratory of Snow (Report), No. 2.** *Seppyo (Snow and Ice)*, Tokyo, 11(5):172–175, **1950.** figs., refs. **DWB**—Pre liminary experiments to make replicas of snow and hoar frost crystals and method of determining the water content in snow studied in the laboratory are briefly reviewed. *Subject Headings:* **1. Snow crystal replicas 2. Water content of snow.**—*H. Arakawa*

10M–268 551.574.1:551.578.41:546.33:546.13

Wakahama, Gorow, **The sea-salt crystals found in the residuals of individual rain drops, graupels and snowflakes, Pt. 1.** *Low Temperature Science, Series A, Physical Sciences*, Sapporo Japan, No. 16:211–226, **1957.** 10 photos, 4 figs., 19 refs. In Japanese; English summary p. 225–226 **DWB, DLC**—The results of studies on precipitation particles collected on glass slides coated with hydrophobic Dri-film and shadow-photographed are reported. The droplets were evaporated, wate vapor was condensed on the residue and the process was repeated until the residue recrystallized

o cubic crystals. The quantity of NaCl in each sample was determined microscopically from the mensions of the crystals. Most of the large NaCl crystals were found in rimed snowflakes and aupel produced in Cb clouds developed in cold air and travelling over a warm sea surface, while the aCl content in raindrops and snow crystals from As or Ns clouds from S. maritime air was unpectedly small. The NaCl content increased with the mass of the precipitation particle. *Subject adings:* **1. Salt content of Precipitation 2. Saline nuclei.**—*SIPRE Abstract.*

Distribution And Frequency Of Snow (551.578.42)

10M–269 551.578.43(420) 551.324.63

Manley, G., **Studies of the frequency of snowfall in England 1668–1956 and the relationship th glacier behaviour.** *International Union of Geodesy and Geophysics. Assoc. of Scientific Hydology, Toronto, Sept. 1957,* [*Transactions*], Vol. 4, pub. **1958.** p. 40–45. 5 figs. **DWB, DLC**—London and its neighborhood, observations of the occurrence of snow and sleet have been kept by rious individuals and institutions almost continuously since 1668. While these observations differ idely in quality it has been possible to compile a sufficiently reliable assemblage of all days on which ow has been observed to fall since 1811. For the earlier years standards of observation are less od, but by making use of suitable reduction factors the records can be reasonably equated with those pt under more modern conditions. The results show fluctuations, but no serious overall change the likelihood of snowfall, and a broad relationship with the mean temperature of the six colder onths. The curve showing the frequency of snowfall on given d ys does not follow a uniform course, it displays irregularities, some of which are very persistent and agree with the "singularities," irregularities in the annual march of temperature, shown by other European records. The fluctuaons in the frequency of snow at London are broadly related to those in Scotland, and may thus ovide a rough index of the mountain accumulation; but they show little agreement with the beaviour of glaciers. The latter is more closely associated with the fluctuations in the accumulated mperature of the summer months in England. *Subject Headings:* **1. Snowfall variations 2. Long eriod snowfall records 3. Glacier variations 4. England.**—*Author's abstract.*

10M–270 551.578.42(775)

Waite, Paul J. (*State climatologist*), **Wisconsin's average winter snowfall.** *Wisconsin Academy eview,* 5(1):1–2, Winter **1958.** 2 figs., map (on back cover). **DWB**—Snowfall varies from 30 in. at eloit in extreme Wisconsin to >100 in. in the extreme north (iron country) on the western slope of he Gogebic Range (1931 1955 average). First snowfall varies from Dec. 1 in the south to early Nov. in the north, and snow cover from 85 days to 140 days (along Lake Superior). Greater cold nd prevailing north winds off of the lake are responsible for excessive snowfall in the extreme north. mportance to agriculture and transportation is stressed. Map shows isohyets of average snowfall n Wisconsin to 10 in. intervals. *Subject Headings:* **1. Snowfall distribution 2. Snow cover 3. Wisonsin.**—*M.R.*

Snowstorms (551.578.45)

10M–271 551.594.6:551.578.45

Asami, Yoshihiro; Kurobe, Teiichi and Nishitsuju, Akira, **Snow noise.** *Sapporo, Japan. Hokkaido Univ. Faculty of Engineering, Bulletin,* No. 18:1–13, May **1958.** illus. tables, graphs, iagrs., 10 refs. In Japanese. (Title romanized: Kosetsuji no zatsuon ni tsuite). **DLC** (Orientalia Div.)—Four different types of antennas were used to study radio noise effects during snowfalls, and ulsating d.c. measured under different snow conditions is recorded and interpreted graphically. Reception is seriously hampered during heavy snowfalls or blowing snow because of corona discharge enerated at the tip of the antenna. The magnitude of the noise is proportional to the antenna urrent. Experimental studies of artificial coronas with characteristics similar to natural snow noise how that the noises can be prevented by smoothing the tip and surface of the antenna and by inulating the tip. *Subject Headings:* **1. Snow static 2. Corona discharge due to snow.**—*SIPRE bstract.*

10M–272 551.578.45:551.591(988)

Diamond, Marvin and Gerdel, R. W., **Occurrence of blowing snow on the Greenland Ice Cap.** *J. S. Snow, Ice and Permafrost Research Establishment, Research Report,* No. 25, April **1957.** 5 p. figs., 5 tables, 2 refs. **DWB**—Blowing snow, a major weather phenomenon on the northwest Greenand Ice Cap, occurs most often in winter and is at a minimum during June, July, and Aug. Blowing now is most commonly associated with winds of over 20 knots, but occurs about 30% of the time when wind velocities are 15–19 knots. Very little blowing snow occurs at wind velocities below 15 knots. During periods of blowing snow, visibility is usually greater than 1 mile when wind speeds are less than 20 knots and less than 1 mile when wind velocities exceed 20 knots. Blowing

snow is most frequent during periods when air temperatures are 10° to 14°F and −11° to −25° at Site 1 and −1° to −20°F and −41° to −45°F at Site 2. Periods of continuous blowing snow usually less than 24 hr in duration and almost half of them are less than 6 hr in duration. *Subject Headings:* **1. Snow storms 2. Visibility in blowing snow 3. Blowing snow.**—*Authors' abstract.*

10M–273 551.515:551.578.45(7

§Fuge, John B. and Kipper, John M., Jr. (both, *Nat. Wea. Analysis Center, U. S. W. B., Was D. C.*), **An early-season snowstorm along the Atlantic coast, December 4–5, 1957.** *Monthly Weath Review*, Wash., D. C., 85(12):417–422, Dec. **1957.** 11 figs., table, 5 refs., eqs. **DWB, DLC**—Ov one foot of snow fell in places along the Atlantic Seaboard on Dec. 4–5, 1957, in connection with secondary low forming in NW North Carolina. A detailed analysis is presented, using PETTERSSEN development (local vorticity change) equation to account for the qualitative development, a CRESSMAN'S method for divergence measurement (1954) plus SWAYNE'S method (1956) for precipit tion calculation to give a more quantitative picture. Sea level 1000–500 mb thickness, and 500 m contour and isothermal charts are presented and discussed for each 12 hours, and Laplacian charts thermal advection in relation to 6-hourly precipitation, a stability index chart and a snow dep chart are included. *Subject Headings:* **1. Snowstorms 2. Cyclogenesis 3. Middle Atlantic State** —*M.R.*

10M–274 551.578.45(57)

Gibovskaia, L. N. and Zholtko, E. A., **Rannii snegopad.** [Early snow-fall.] *Priroda*, Moscow No. 9:126, Sept. **1958.** photo. **DLC**—A heavy snow on the night of September 25–26, 1955 Krasnoyarsk is described. At some places the snow attained a thinckess of 10 cm. The snow r mained for several days. The subsequent thawing led to a rise in the water level of the Yniscy Riv and of its tributaries, causing a series of disasters. Such a snowfall has not occurred in Krasnoyars since 1912. *Subject Headings:* **1. Early snowfall 2. Excessive snowfall 3. Krasnoyarsk, U.S.S.** —*I.L.D.*

10M–275 551.578.45(73

Ludlum, David M. (*Ed. Weatherwise, Boston*), **Some noteworthy snows of 1956–1957.** *Weathe wise*, Boston, 11(1):20–21, 34, Feb. **1958.** photo. **DWB**—Accounts of: 1) early Nov. blizzard i western plains, 2) Thanksgiving snows on Lower Lakes; 3) record Jan. snows in Colorado, 4) lat spring blizzard on plains, 5) snow on 7–8 March in Gulf States; 6) mid-April snow in middle Atlanti states; 7) April snows on east slopes of Rockies; and 8) early snow season in New England. *Subje Headings:* **1. Snowstorms 2. United States.**—*M.R.*

10M–276 551.578.4

Shiotani, Masao, **On the snow storm.** *Researches on Snow and Ice*, Tokyo, No. 1:29–34, Oct **1953.** 4 figs., 2 tables, 6 refs., 10 eqs. In Japanese. **DWB**—Data on physical conditions in lowe 500 cm during fall of snowflakes (temperature, speed of fall, etc.) presented in tables and graphs and theory worked out. *Subject Headings:* **1. Snowstorms 2. Snowflake velocity.**—*M.R.*

10M–277 551.578.45(73

U. S. Weather Bureau, **Some extremes of snowfall.** Rev. Dec. **1958.** (On reverse of its *Dail Weather Map*, Dec. 23, **1958.**) figs., photos. **DWB**—A display-type presentation of facts and data on snow, how it affects life and property, picturesque aspects, color variations, physical properties meteorological factors, blizzards, avalanches, notable snowstorms and blizzards in U. S. (1846, 1888 1922, 1940, 1947, 1952). Record snowfalls are also tabulated for U. S. *Subject Headings:* **1. Snow storms 2. Record snowfalls 3. U. S.**—*M.R.*

SNOW SURVEYS (551.578.46)

10M–278 551.578.46:629.13(237)

Codd, Ashton R. and Nelson, Morlan W., **Use of aircraft in snow surveying.** *Western Snow Conference, Salt Lake City, April 1954, Proceedings*, pub. **1954.** p. 83–85, table. **DWB**—Advantages and disadvantages of aircraft for snow surveys on relatively inaccessible snow courses in the Northern Rockies are discussed, and costs of present aerial surveys shown to be about ½ or ⅓ as great per measurement as were the previous costs by foot or snowmobile. Helicopters can operate at $80 per hour, and in one state for $42 per course. Courses must be near fields, or if only depths are desired the stake can be constructed so a pilot can read the depth without landing. Weather is the greatest obstacle to air travel, but it also hampers surface travel. *Subject Headings:* **1. Snow surveys by aircraft 2. Northern Rocky Mountains.**—*M.R.*

10M–279 551.501:551.578.46(05)

Eisenlohr, William S., Jr. (*U. S. Geological Survey, Wash., D. C.*), **Snow survey data in the Water Resources Review.** *Western Snow Conference, 21st, Boise, Idaho, Oregon, April* **1953.** p. 7–8. **DWB**—The *Water Resources Review*, compiled in Washington, D. C. and published in 14 issues each year with a circulation of 3000 copies serves for the dissemination of current information on runoff conditions over the United States and Canada. Included are also summaries of snow data computed as means for river basins. *Subject Headings:* **1. Runoff data 2. Snow curves 3. Periodicals 4. United States 5. Canada.**—*A.A.*

10M–280 551.578.46:631.4

Fredericksen, Don G. (*Natl. Assoc. Soil Conservation Districts, Gooding, Idaho*), **Use of snow survey data by soil conservation districts.** *Western Snow Conference, 26th, April 1958, Proceedings,* pub. Oct. **1958.** p. 32–35. **DWB** (M(06) W527p)—Irrigators in Idaho, Wyoming, and other western states are relying more and more on the ability and efficiency of the forecasters—with respect to the amount of winter snow that might accumulate in the different areas as well as the seasonal water resources that result from snow pack. Information on soil conservation and the activities of the Bureau of Reclamation and the U. S. Corps of Engineers in the areas in question is given in detail. *Subject Headings:* **1. Soil conservation 2. Snow accumulation.**—*N.N.*

10M–281 551.578.46(74)

Harrington, Arthur W. (*U. S. Geological Survey, Albany, N. Y.*), **Snow surveys in the Northeast and uses of data.** *Western Snow Conference, 21st, Boise, Iadho, April 1953, Proceedings.* p. 1–3. 2 refs. **DWB**—A general report on snow surveys mainly in New York State, covering the history of such surveys, the collection, dissemination and use of snow data. By 1940 some 250 different snow surveys were made 3–4 times each winter. *Subject Headings:* **1. Snow surveys 2. New York 3. New England.**—*A.A.*

10M–282 551.578.46(52) 551.508.77

Higashi, Akira (*Faculty of Science, Hokkaido Univ., Japan*), **Snow survey in Hokkaido, Japan.** *International Union of Geodesy and Geophysics. Assoc. of Scientific Hydrology, Toronto, Sept. 1957, Transactions*], 4, pub. **1958.** p. 22–39. 10 figs., 5 tables, 11 refs., 12 eqs. **DWB, DLC**—Snow survey work conducted in the Hokkaido area by the Hokkaido University group is described. As a method of snow surveying, which is suited to natural conditions and urgently needed in Japan, the "quantitative method" was proposed by S. SUGAYA. To avoid the disadvantage of time-consuming and laborious survey by this method, a practical method was designed for further continuation in the same basin in which the quantitative method was once used. For the establishment of the practical method, the snow surveys were made for four years by the same method in the Chubetsu River Basin. The representativeness of a survey route was proved in various conditions from year to year. This method will be applicable for any basin in which the main factor determining snow cover distribution is altitude. The quantitative method was applied to the Lake Shikaribetsu Basin and the results were used for practical operation of the hydroelectric power plants system which is using the lake as a reservoir. Snow survey work accompanied with more precise studies of precipitation over the basin are still continuing. For the efficient use of the water of Lake Shikaribetsu during winter, continuous indication of snow deposit in the basin was required. The radioactive snow gauge was employed for this purpose, and efforts to put it in practical use have been continued for the last few years. Some technical achievements in the construction of the gauge are briefly described. *Subject Headings:* **1. Snow surveys 2. Radioactive snow gages 3. Hokkaido, Japan.**—*Author's abstract.*

10M–283 551.578.46(52)

Higuchi, Keji and Itagaki, Kazuhiko, **Snow survey in the Chubetsu River Basin by the method of long snow course. (Second partial report.)** *Sapporo, Japan, Hokkaido Univ. Faculty of Science, Geophysical Bulletin,* 3:51–62, Dec. **1953.** 2 figs., 7 tables. In Japanese; English summary p. 62. **DWB**—The results of a snow survey carried out in April 1953 along the Yokomanbetsu Snow Course in the Chubetsu River Basin are reported. The relationship between altitude and the water equivalent of snow cover along this course is analyzed. The results of a survey at the Kowan course and of the Nokamen creek are discussed. The efficiency of totalizers was tested. *Subject Headings:* **1. Snow surveys 2. Water content of snow 3. Chubetsu River Basin, Japan.**—*From authors' abstract.*

10M–284 551.5786.46

†Onuma, Masayuki, **Outline of snow survey.** *Researches on Snow and Ice,* Tokyo, No. 1:218–226, Oct. **1953.** 11 figs., 1 chart (fold.), table, 26 refs. In Japanese. **DWB**—Review of literature and

methods of snow sampling and runoff forecasting, mainly in Western U. S. A. *Subject Heading* **1. Snow surveys 2. Runoff forecasting.**—*M.R.*

10M–285 551.578.4

Shpak, I. S., **K metodike snegomernykh s"emok na poverkhnosti vodokhranilishcha.** [Metho of snow surveying on the surface of a water reservoir.] *Meteorologiia i Gidrologiia*, Leningra No. 3:46–48, March **1956.** 2 tables, ref., eq. **DWB, DLC**—The mean water content of snow calculated from the product of mean snow density and mean height of the snow cover. Since sno density varies considerably less than snow height, only the latter has to be measured. A statistica analysis is given of the survey method for determining the optimum length of courses for measurin the height of snow cover at the Tsimliansk reservoir. Tables giving the statistical characteristi of the height of snow cover and the empirical and theoretical errors (in percent) of measurements c height of snow cover and probability of 0.67 and 0.95 are given. *Subject Headings:* **1. Snow survey 2. Water content of snow 3. Snow density 4. U.S.S.R.**—*I.L.D.*

Snow Physics (551.578.46:53)

10M–286 551.578.46:531.75

Bender, J. A., **Air permeability of snow.** *U. S. Snow Ice and Permafrost Research Establishmen Research Report* No. 37, Nov. **1957.** 19 p. 16 figs. (incl. photos), 3 tables, 45 refs., 30 eqs. **DLC**— Laboratory experiments on the air permeability of various screened and natural snows are describe and results are analyzed to determine whether the parameters obtained from the measurement could be used to define a snow type. The permeability of a snow sample of known porosity (calcu lated from density) was determined over a wide range of air velocities, the sample was then com pacted artificially a few mm, its density was determined, and its permeability measured again. Th procedure was used to obtain curves for several densities of the same sample. Air flow appeare laminar for velocities less than 5 cm/sec in fine-grained snow (less than 0.8 mm in diam), 2 cm/sec i medium-grained snow (0.8–1.2 mm diam.), and 1 cm/sec in larger-grained snow. A formula i presented expressing all of the results obtained under laminar-flow conditions in a single relationship and an equation for estimating grain size from initial permeability and initial porosity is suggested Snow conversion tables and a discussion of the effect of varying sample porosity on its permeability are appended. *Subject Headings:* **1. Snow permeability to air 2. Snow density.**—*Author's abstract*

10M–287 551.578.46:656.11

Diamond, Marvin, **Studies on vehicular trafficability of snow, Pt. 1.** *U. S. Snow, Ice and Permafrost Research Establishment, SIPRE Report*, No. 35, April **1956.** 24 p. 19 figs., 5 tables, 8 refs., eqs. p. 21–24. Bader, Henri: **Some theoretical considerations on the trafficability of snow. DLC**— Four light snow vehicles were used to test the snow cover at Keweenaw Field Station, Houghton, Mich. in Feb. and March 1955. Maximum drawbar coefficient was obtained at 20–40% track slip, indicating that drawbar pull is a function of the frictional resistance of snow. The efficiency coeffi cient of the M-7 tractor, with or without angle grousers, was higher than that of the ladder-type tractor. Highest efficiency was obtained at lowest slip. Tractive effort vs. vehicle weight can be expressed by a modification of Coulomb's equation. Angle of internal friction was 26–32° with a mean of 28°. In these trials, tractive effort vs. load appears to be defined by Coulomb's equation for cohesionless materials. An appendix by H. Bader discussed some theoretical considerations on trafficability of snow. *Subject Heading:* **1. Snow trafficability.**—*Author's abstract.*

10M–288 551.578.46:539.3

Fujimoto, Tomekichi, **Study on the mechanical structure of compressed snow layer.** *Seppyo* (*Snow and Ice*), Tokyo, 12(1):207–213, **1950.** diagrs., table, foot-refs. In Japanese. **DWB**— Contains theoretical and empirical data and illustrations of equipment used in study. *Subject Headings:* **1. Snow mechanics 2. Snow compaction.**—*M.R.*

10M–289 551.578.46:539.3

Furukawa, Iwao, **Studies on deposited snow load caused by snow settling.** *Researches on Snow and Ice*, Tokyo, No. 1:155–166, Nov. **1953.** 17 figs., 11 tables, 4 refs., 17 eqs. In Japanese. **DWB** —The settling force due to the deposited snow cover is studied to avoid damage to buildings (such as illustrated in Fig. 1). The settling force due to snow cover action on an object seems to increase linearly as the depth of snow cover and the height of the object increase. *Subject Headings:* **1. Snow load 2. Snow mechanics 3. Building design.**—*H. Arakawa.*

10M–290 551.578.46:656.11 551.578.46:539.3

*Gerdell, R. W.; Parrott, W. H.; Diamond, M. and Walsh, K. J., **Some factors affecting the vehicular trafficability of snow.** *U. S. Snow, Ice and Permafrost Research Establishment, Research*

Paper, No. 10, Dec. **1954.** 13 p. 12 figs., 5 tables, 3 refs. **DLC**—The trafficability of tracked vehicles on level and sloping surfaces was studied depending on the mechanical properties of snow and meteorological conditions. The snow properties were measured by a drop cone penetrometer, Canadian hardness gauge and a rammsonde. The trafficability as measured by draw-bar pull and hill climbing ability is correlated with air and snow temperature, snow density, depth of track, and solar radiation. *Subject Headings:* **1. Snow trafficability 2. Snow mechanics.**—*A.A.*

10M–291 551.578.46:539.62

*Huzioka, Tosio and Hikita, Yutaka, **Friction between snow and iron plate (Studies on the resistance of snow sledge, Pt. 2).** *Low Temperature Science, Ser. A, Physical Sciences*, Sapporo, Japan, 13:37–47, **1954.** 6 figs., table, 6 refs., eqs. In Japanese; English summary p. 46–47. **DWB**—Data obtained from cold room tests of friction at low temperatures (−20° to +4°C) are tabulated, graphed and discussed. *Subject Heading:* **1. Snow friction.**—*M.R.*

10M–292 551.578.46:539.42

*Inaho, Yoshinobu, **On the hardness of snow.** *U. S. Snow, Ice and Permafrost Establishment, Translation*, No. 33, March **1955.** 6 p. 6 figs., 2 tables. **DLC.** Translation from Japanese of his **Sekisetu no kodo ni tsuite,** in *Seppyo* (*Snow and Ice*), Tokyo, 3:343–349, **1941. DWB**—Experimental proof is given for the relationship $\gamma = K\{m(h+r)\}^{1/a}$, where m = weight of cone shaped hardness tester, h = drop height; γ = depth of penetration; K, a = coefficients. The critical aspects of this equation are discussed. K seems to depend on the kind of snow (dry, wet, granular), a mostly varies between 3 and 4.5. No concurrent density determinations were made. *Subject Heading:* **1. Snow hardness.**—*A.A.*

10M–293 551.578.46:539.3

Kojima, Kenji, **Visco-elastic property of snow.** *Low Temperature Science, Ser. A, Physical Sciences*, Sapporo, Japan, 12:1–15, **1954.** 9 figs., 2 plates, table, 4 refs. In Japanese; English summary p. 12–13. **DWB**—The relationship between the strain e and the time t is expressed by the formula $e = \frac{p}{E} + \frac{p}{E} \cdot \frac{t}{\tau_1} + \frac{p}{E}\left(1 - E - \frac{t}{\tau_2}\right)$ where E_1 and E_2 are elastic constants, τ_1 and τ_2 are the relaxation and retardation time, respectively, and p is the pressure. The viscosities of the snow are given by formulas $n_1 = E_1\tau_1$ and $n_2 = E_2\tau_2$. The results are tabulated and graphed. The relationships between n and n_1 and the temperature of snow are represented by n_2 $0.85 \times 10^7 e^{-0.157T}$ dyne min/cm², $2.0 \times 10^7 e^{-0.157T}$ dyne min/cm². *Subject Headings:* **1. Snow mechanics 2. Viscosity of snow.**—*Based on author's abstract.*

10M–294 551.578.46:539.3

Kragel'skiĭ, I. V. and Shakhov, A. A., **Izmenenie mekhanicheskikh svoĭstv snegovogo pokrova vo vremeni (zatverdenie).** [The variation of mechanical properties of snow cover with time (hardening).] (In: Vilenskiĭ, D. G., (*ed.*), **Fiziko-mekhanicheskie svoĭstva snega,** Moscow, **1945.** p. 10–13. 3 figs., 2 tables.) **DLC**—The gradual increase in strength of the snow cover after deformation above a temperature of −54°C is based on a recrystallization process. The increase follows a kind of logistic curve and is more intense at lower temperatures, higher primary deformation pressure and for more frequent successive deformations. In order to reach a surface hardness of 10 kg cm^{-2} after 8 hours, ten subsequent applications of a 4.5 ton roller at −15°C are necessary. *Subject Headings:* **1. Snow mechanics 2. Snow hardness 3. Airfield construction.**—*A.A.*

10M–295 551.578.46:539.3

Landauer, J. K., **Creep of snow under combined stress.** *U. S. Snow, Ice and Permafrost Research Establishment, Research Report*, 41, Dec. **1957.** 12 p. 7 figs. (incl. photos), 4 tables, 13 refs., 20 eqs. **DLC**—Laboratory experiments on the creep of sifted snow under uniaxial, hydrostatic, and confined-side compressive stresses are described, and the results are discussed on the basis of an additive theory for combined stresses. Stress (4–40 psi) and temperature (−3.6C to −13.6C) dependence was investigated for 35 samples (initial density≅0.4 g/cm³) subjected to uniaxial and hydrostatic stress for 200-sec time increments. Another series of 104 samples (initial densities 0.36–0.63) was subjected to uniaxial, hydrostatic, and confined-side compressive stresses until an arbitrary change in density was reached. In all cases the applied stress ultimately became a shear stress acting between grains, the open structure reacting differently to combined stresses and separate uniaxial stresses. An activation energy of 13,400 cal/mol was obtained from the first group of tests. *Subject Headings:* **1. Snow creep 2. Snow mechanics.**—*Author's abstract.*

10M–296 551.578.46:539.6

*†Minnesota, Univ. Mechanical Engineering Dept., **Friction on snow and ice.** Project DA 8-66-02-001 (DA-11-190-ENG-1), (Final Report), June **1955.** 286 p. appendixes. numerous

figs., photos, tables and eqs. 372 refs.—Voluminous summary of work done on subject of snow friction under contract with Univ. of Minnesota from Aug. 1951 to June 1955, combining results reported in 3 progress reports (1952, 1953 and 1954) and adding results for 1954–5. Theory of friction is that frictional heating (or electrical effects) produces a liquid film on the ice surface. Static and kinetic friction were measured under differing loads, areas, sliding material temperature, humidity, time of contact and speed. Time of contact, temperature, humidity and area are statistically significant. Velocity itself was not a factor in kinetic friction. A short period of contact was proven to be necessary to produce static friction and longer periods of contact produced higher values of friction. Current theory is developed in detail and historical theoretical evolution reviewed at length. Electrical measurements, radioactive tracing of moisture from snow to runners, freezing experiments in laboratory, etc., are also treated. A thorough bibliography is appended. Many nomograms, diagrams, photographs of equipment and tables of empirical results are included. *Subject Headings:* **1. Snow friction 2. Static friction on snow. I. Fitz, C. Dudley II. Jordan, Richard C.**—*M.R.*

10M–297 551.578.46:539.3 624.14

Nagasawa, Makoto, **Compaction of snow by static and kinetic loads.** *U. S. Snow, Ice and Permafrost Establishment, Translation*, No. 35, Aug. **1955.** 8 p. 19 figs., 2 tables. **DLC.** Translation by Charles A. Meyer & Co., of original Japanese, **Sei oyobi do kaju ni yoru atsetsu ni tsuite,** in *Seppyo* (*Snow and Ice*), 5:249–256, **1943. DWB**—A preliminary report showing the applicability of some earth compacting machines to snow compaction. A water-spray vibrator increases the heaving strength 8 times. The deformation and subsidence of snow as affected by loading area is given and some relations between hardness and bearing strength are illustrated. *Subject Headings:* **1. Snow compaction 2. Snow mechanics 3. Japan.**—*A.A.*

10M–298 551.578.46:534.2:551.596.1

Ooura, Hirobumi, **Sound velocity in a layer of snow cover.** *Seppyo* (*Snow and Ice*), Tokyo, 12(2):23–28, **1950.** tables. In Japanese; English summary p. 27–28. **DWB**—The speed of sound in a snow layer is about 190–250 m/sec, and decreases as the density of snow increases. The speed of sound increases as the size of snow particles and the water content of the snow increase. *Subject Heading:* **1. Sound velocity in snow.**—*H. Arakawa.*

10M–299 551.578.48:624.182:539.3

Shidei, Tsunahide, **Creeping pressure of deposited snow on slope.** *Researches on Snow and Ice*, Tokyo, No. 1:189–196, Nov. **1953.** 8 figs., 3 tables, 2 refs., 15 eqs. In Japanese. **DWB**—Creeping pressure of deposited snow cover along several slopes was measured in the field. This creeping pressure is proportional to the square of the water content of the snow cover. The snow covered area exerting this pressure at a point on the slope is roughly proportional to the water content of the snow cover. Hence, the trees used for shelterbelts against avalanches must be stronger, but can have wider spacing in areas expecting heavy snow covers. *Subject Headings:* **1. Snow cover pressure 2. Snow creep 3. Avalanche prevention.**—*H. Arakawa.*

10M–300 551.578.46:53

Shidei, Tsunahide, **Research on snow properties, Pt. 1.** *Seppyo* (*Snow and Ice*), Tokyo, 11(5):151–158, **1950.** 9 figs., tables. **Pt. 2,** *Ibid.*, 12(1):213–218, **1950.** diagrs., tables. In Japanese. **DWB**—Pt. 1 is an elaborate study, with data in tables and many graphs, on physical properties of snow. Pt. 2 is a quantitative study of snow physics with many scatter diagrams and tables. *Subject Headings:* **1. Snow physics 2. Snow research 3. Japan.**—*M.R.*

10M–301 551.578.46:539.6

Shidei, Tsunahide and Miyakawa, Shin-ichi, **Some model experiments on static friction of snow-sledge.** *Seppyo* (*Snow and Ice*), Tokyo, 12(4):128–134, **1951.** 5 figs., 5 tables. In Japanese. **DWB**—Results of engineering experiments are presented in tables and graphs, and the equipment is illustrated. *Subject Headings:* **1. Snow friction 2. Static friction on snow.**—*M.R.*

10M–302 551.578.46:539.3

Shidei, Tsunahide and Takashi, Kihei, **Settling force of deposited snow cover.** *Seppyo* (*Snow and Ice*), Tokyo, 12(2):33–37, **1950.** figs., tables. In Japanese. Similar study in: *Researches on Snow and Ice*, Tokyo, No. 1:167–179, Nov. **1953.** 7 figs. In Japanese. **DWB**—The settling force of deposited snow acting on an object of moderate cross section was measured in the field and it was shown that the maximum possible settling force under favorable conditions attains $\sigma.p.Z$, where σ is the mean stress due to the snow cover acting on the object in kg weight/cm, p the periphery of the object, and Z the effective height. Hence pillars, poles, etc., must be designed to bear this limiting value. *Subject Heading:* **1. Snow load.**—*H. Arakawa.*

10M–303 551.578.46:537.311

Shimada, Hachiro, **Electrical resistance of snow.** *U. S. Snow, Ice and Permafrost Establishment, Translation* No. 31, Nov. **1954.** 4 p. 5 figs., 3 tables. **DLC**—Translation from Japanese of his article **Sekisetsa no denki teikô** in *Seppyo* (*Snow and Ice*), Tokyo, 3:503–506, **1941. DLC**—The specific electrical resistance of different layers of snow was studied with a specially designed simple apparatus consisting of electrodes, boards filled with galvanized iron plates and a switch device reversing polarity at the rate of about 1200 times per min. Data are given on the electrical resistance of snow cover and its variation with type of snow. *Subject Headings:* **1. Snow resistivity 2. Translations.**—*I.L.D.*

10M–304 551.578.46:656.11(988)

Skinrood, A. C., **Effect of snow properties on vehicle trafficability in the Arctic.** *U. S. Snow Ice and Permafrost Research Establishment, Special Report,* No. 22, Feb. **1957.** 13 p. 26 figs. (incl. photos), tables, 5 refs. **DLC**—The results of studies conducted by the Canadians in the summer of 1955 as a part of an 1100-mile research expedition (known as Project Jello) in the interior portion of the Greenland Ice Cap are reported. Hard wind crusts and irregular surface conditions in the Arctic alter the trafficability problems in the area from those found in the temperate regions. A relation was found between the maximum drawbar pull and the ram hardness number. The maximum drawbar pull of a United States Army M29C cargo carrier varied from 2800 to 3700 lb., and was between 3000 and 3400 lbs., in 75% of the tests. The photographic techniques developed during this expedition were found to be useful in determining the depth to which the passage of a vehicle affects the snow. *Subject Headings:* **1. Snow trafficability 8. Greenland Ice Cap 3. Greenland.** —*N.N.*

10M–305 551.578.46:53 551.578.48

†Sulakvelidze, G. K., **Sneg i ego svoĭstva.** [Snow cover and its properties.] *International Union of Geodesy and Geophysics. Assoc. of Scientific Hydrology, Toronto, Sept. 1957,* [*Transactions*], Vol. 4, pub. **1958.** p. 166–184. 9 tables, 55 refs., 22 eqs. English summary, p. 166. **DWB, DLC**—Coefficients characterizing the physical properties of snow as dependent on density and moisture content are determined on the basis of laboratory and field investigations in the Caucasus Mts., and data are tabulated. The properties studied include: compression, viscosity, albedo, brightness, radiation absorption, thermal conductivity, melting and evaporation in mountain regions, and the thermal balance. Processes of avalanche formation and movement are also analyzed. Equations are derived describing the heat exchange in a snow mass at temperatures less than −25°C, at 0° to −25°C, and in highly compacted frozen snow, taking into account the energy of phase transitions, the complete heat balance of the snow cover depending on its density and moisture content, and the equilibrium of loose and packed snow masses on mountain slopes. The relation between the physical and mechanical properties of snow, angle and length of slope, and avalanche velocity is determined, and the avalanche impact on a static obstacle under varying snow and slope conditions is calculated. *Subject Headings:* **1. Snow physics 2. Avalanches.**—*SIPRE abstract SIP* 16936.

10M–306 551.578.463:551.578.48

Tushinskiĭ, G. K.; Guskova, E. F. and Gubareva, V. D., **Perekristallizatsiia snega i voznikhovenie lavin.** [Recrystallization of snow and the formation of avalanches.] Moscow, Izdat. Mosk. Univ., **1953.** 116 p. **UNCHECKED:**—Review by L. Baraniecki in *Czasopismo Geograficzne,* Warsaw, 26(3):282–283, **1955. DLC**—The reviewed monograph presents the results of field investigations made during the winters 1948/49 and 1949/50 and of laboratory experiments on processes taking place in the snow cover. The first part of the book deals with methods and results of observations on the influence of water vapor migration and ground temperature on the recrystalization of snow. The process itself is discussed in Pt. 2. More than 5000 microphotographs of snow were used to study the evolution of snow crystals and the band between them. It was found that strong wind affects the lower layers of a snow cover by drawing out air and water vapor from the bottom to the top of the cover, thereby lowering the density of the lower layers and cementing the upper layers. The thus formed snow slab looses its bond with the loose bottom snow and tears off easily to form an avalanche under the effect of even a light jolt. The last chapter of the second part is devoted to a new classification of snow based on observations of stratigraphic profiles and microscopic analyses. Part 3 deals with the results of observations of the changes occurring in the mechanical properties of snow. The last part is devoted to a discussion of concrete experiments carried out on experimental lots during the two winters. The work is concluded by a summarization of the obtained results and an instruction on how to make terrain observations to determine avalanche periods and prevent disasters. *Subject Headings:* **1. Snow mechanics 2. Snow density 3. Snow metamorphism 4. Avalanche formation I. Baraniecki, L.**—*A.M.P.*

10M–307 551.578.46:656.11

U. S. Army. Transportation Corps, **Arctic tests of mass offroad vehicles, 1955.** Final report on Project 9-98-09:001, Climatic tests and evaluation of transportation equipment, Task 12, Jan. **1957.** 79 p. 23 figs. (incl. photos), charts, tables. **DWB** (355.82 U582c)—Tests were made at Houghton, Mich., during the winter and spring of 1955 of various types of equipment under varying snow depths. Snow data are tabulated on p. 32 (snow depth, density, surface hardness, air temperature, track depth, etc.). The density of virgin snow and of the snow under the track are compared for each type for different dates in Feb. and March. *Subject Headings:* **1. Snow trafficability 2. Snow vehicles 3. Houghton, Mich.**—*M.R.*

10M–308 551.578.46:53 551.34:66

†U. S. Snow, Ice and Permafrost Research Establishment, **Some aspects of snow, ice and frozen ground.** Its *SIPRE Report*, No. 10, Aug. **1953.** 32 p. refs., p. 29–32. **DLC**—Outlines a survey of problems, accomplished during the first two years of SIPRE since March 1949, before its transfer to Wilmette, Ill. A list of SIPRE contracts, brought up to date, is given. The present state of knowledge is shortly summarized, emphasizing the physical properties of snow and ice and, in more detail, the engineering aspects of frozen ground. A list of research needs and military objectives is added. *Subject Headings:* **1. Snow physics 2. Snow and ice research 3. Frozen ground research 4. United States.**—*A.A.*

10M–309 551.578.46:539.3

Yamaji, Kenji and Kuroiwa, Daisuke, **Study of elastic and viscous properties of snow by the vibration method, Pt. 1.** *Low Temperature Science, Ser. A, Physical Sciences*, Sapporo, Japan, 13:49–57, **1954.** 10 figs. (incl. photos), 5 refs., 6 eqs. In Japanese; English summary p. 57–58. **DWB**—We have measured Young's modulus E and vibration loss tan δ of snow by the so-called "resonance method." The former is calculated from the resonance frequency f_s of a rectangular bar of snow by means of the equation $E=48\pi^2 l^4 \rho f_s^2/a^2 m^4$; where l, a and ρ denote length, thickness and density of the bar, respectively. m is a numerical constant characteristic of the mode of vibration. The latter is determined in the following manner. When a snow bar is set free from its state of forced vibration, its amplitude decreases imponentially with time. If we denote the time-interval required for the amplitude to decrease to half its initial value by $t_{\frac{1}{2}}$, tan δ is given by tan $\delta = \ln 2/\pi f_s t_{\frac{1}{2}}$. Young's modulus of snow thus measured proved to be of the order of 10^9 (C.G.S.) and to increase with increasing density and decreasing temperature. Vibration loss of snow was about 10^3 for lower temperatures, but for the temperatures in the vicinity of the melting point it became as large as 10^5. It showed the tendency to increase with decreasing density. Activation energy, as estimated from the temperature characteristics of the internal viscosity coefficient, amounted to 12.3~18.3 kcal/mol. The present experiments are only preliminary, in that the snow used was that stocked in our frozen room since last winter, so that the internal construction may differ considerably from that of fresh snow. Detailed discussions will therefore be left to future investigation, in which the measurements are to be carried out for newly deposited snow. *Subject Heading:* **1. Snow mechanics 2. Snow physics.**—*Authors' abstract.*

10M–310 551.578.46:539.3

Yosida, Zyungo and Kuroiwa, Daisuke, **Snow subsidence due to impulsive loading.** *Seppyo (Snow and Ice)*, Tokyo, 12(2):28–33, **1950.** figs. In Japanese. **DWB**—Physical study. *Subject Heading:* **1. Snow mechanics.**

10M–311 551.578.46:539.3

Yosida, Zyungo; Oura, Hirobumi; Kuroiwa, Daisuke et al. (*all, Applied Physics Section, Institute of Low Temperature Science*), **Physical studies on deposited snow, Pt. 3, Mechanical properties (Pt. 2).** *Sapporo, Japan. Hokkaido Univ. Institute of Low Temperature Science, Contributions*, No. 11:1–41, **1957.** 27 figs (incl. photos), table, 7 refs., eqs.—The results of experimental studies by the Institute of Low Temperature Science on the behavior of a body falling into snow are reported. The break-down of snow by a falling body; the simplest case of break-down of snow by a falling body; the resistance exhibited by stratified snow; the relation between the resisting force and the stratification of snow; the stop of the fall of the falling body, and the hardness of snow are discussed. The hardness of snow was found to vary from 0.5 to 1.5 gr/kg-wt cm in the case of compact snow. The mean falling speed of the body investigated varied from 35 cm/sec to 70 cm/sec. *Subject Heading:* **1. Snow mechanics.**—*N.N.*

10M–312 551.578.46:539.3

Yosida, Zyungo et al., **Physical studies on deposited snow, Pt. 4, Mechanical properties (Pt. 3).** *Sapporo, Japan, Hokkaido Univ., Institute of Low Temperature Science, Contributions*, No. 13:55–100, **1958.** 32 figs. (incl. photos), 8 refs., 25 eqs.—The first part of the article investigates the relationship

between the manner of contraction of snow and different constant speeds of contraction (from 1 mm/min to 1 m/min). The compression was registered by a recording galvanometer or by an electromagnetic oscillograph. Three types of contraction are found: 1) At speeds of 10 to 20 mm/min the resisting curve took the form of saw-teeth. The pillar of snow was lessened in height by being broken into fragments of ice near its top or bottom plane, without remaining portion undergoing any contraction (destructive contraction); 2) The saw-teeth of the curve of resistance became broader with decreasing compression speed and finally disappeared. The pillar of snow ceased to break at the end plane and contracted uniformly through its whole height (plastic type); 3) When the compression speed was increased the saw teeth of the curve became narrower, ending in a continuous curve with small fluctuations. The fragments of ice into which the end plane of the snow pillar had been breaking came to unite themselves to form a thin plate hanging from the end of the pillar like a tongue (destructive contraction of the second kind). With lowering of temperature, the critical speed of destructive contraction decreased, while it increased for the other types. Independently of the types, a decrease in the resistance of the snow accompanied the increase of compression speed. The second part of the article develops a method to compute numerically the thickness of snow cover, at any time after the commencement of the snow season, from the precipitating data of snow up to that time, by the use of a formula which is discussed in a previous paper: $\eta = \eta_a \times \exp(k\rho)$ where η = compressive viscosity of snow layers: ρ = snow density. The distribution of computed density within the snow cover also agrees well with that of the density which was actually observed. *Subject Headings:* **1. Snow mechanics 2. Snow cover depth computation.**—*From authors' abstract.*

10M–313 551.578.46:537.226

Yosida, Zyungo et al., **Physical studies on deposited snow, Pt. 5, Dielectric properties.** *Sapporo, Japan, Hokkaido Univ., Institute of Low Temperature Science, Contributions,* No. 14:1–33, **1958.** 17 figs., table, 16 refs., 29 eqs.—Snow is an insulator, characterized by a two component system composed of air and ice. When wet, snow becomes a three-component system composed of air, ice and water. The authors study the structure of the ice networks which compose the snow. They try to establish the relationships between the dielectric properties of snow and the structure of the ice networks of snow. For this purpose, the dielectric constant ϵ' and dielectric loss ϵ'' of a large number of snow samples were measured. Impurities contained in snow bring about great changes in the dielectric properties and make the experiments very complicated. The authors avoided this difficulty by considering an ideal snow which was supposed to have lost ion conductivity arising from the impurities. The experimental determination of the dielectric properties of this ideal snow is realized by constructing a condenser and by determining the values of the electric capacity and the electric resistance of that condenser. The elements ϵ' and ϵ'' were measured for the frequency f of alternating electric force ranging from $\frac{1}{2}$ Kc to 1 Mc. It is shown that ϵ' and ϵ'' of the imaginary snow, could, even if approximately, be expressed in dependence on f by DEBYE'S formulae. The dielectric properties of the imaginary snow should be specified by the three characteristic constants, static and optical dielectric constants ϵ_s, ϵ_0 and relaxation time τ. The relationships between ϵ_s, ϵ_0 and ρ (snow density) were formulated by the use of O. WIENER'S theory which is based on the conception that the geometrical configuration of ice within the snow can to some extent be specified by a number called Formzahl u. Some comments were made on the physical meaning of u. The ice in snow is always constructed so as to be more or less continuous both parallel and perpendicularly to the direction of the applied electric force. When wet snow was cooled down to below 0°C, a change $\Delta\epsilon_0$ was produced in its optical dielectric constant due to the freezing of free water contained in it. A linear relation was found to hold between $\Delta\epsilon_0$ and the free water content w which the wet snow had before the cooling. *Subject Headings:* **1. Dielectric properties of snow 2. Snow cover structure.**—*A.V. and authors' abstract.*

SNOW COVER (551.578.46)

10M–314 551.578.46(47)

Karol', B. P., **Snezhnyĭ pokrov.** [Snow cover.] Leningrad, Gidrometeoizdat, **1949.** 72 p. 24 figs., 10 tables. **DWB** (M78.46 K18sn)—Snow covers the ground in the USSR anywhere from 1–2 months of the year in the south to 9–10 months each year in the north. Therefore, its study and measurement are of primary importance for the economy of the country. The present pamphlet gives in condensed form information of the form, types, measurement, physico-mechanical properties (radiation, illumination in snow cover, traction, hardness, wind effects, sound phenomena in the presence of snow cover, electrical properties); effect of snow and snow cover on soil and air temperature, and on wind; disappearance of snow cover; regional aspects in USSR; snow cover in mountains, role in human economy, and finally, snow as building material. *Subject Headings:* **1. Snow cover 2. U.S.S.R.**—*M.R.*

10M–315 551.578.466(748

Miller, Dixon R. (*Hydrologic Observer, Lond Pond, Pas.*), **Springtime in the Poconos.** *Weatherwise*, Boston, 11(4):132–133, Aug. **1958.** 2 photos. **DWB**—Drifts which built up on Feb. 16, 1958 in the Poconos of N.E. Pennsylvania remained until May 19. Ice remained on the lake until April 27. Deepest drift in Feb. was 20 ft; this was still 2 ft deep on May 13 and covered an area 50 ft by 18 ft. A photograph shows the remains of the drift on May 19. This is the latest snow lying on record in the area. *Subject Headings:* **1. Snow cover 2. Snowdrifts 3. Poconos, Penna.**—*M.R.*

10M–316 551.578.46(437.1

Nekovář, Frantisšk, **Sněžné poměry jižních Čech.** [Snow conditions in Southern Bohemia.] *Ceskoslovenská Společnost Zeměpisná, Prague, Sbornik*, 62(3):210–228, **1957.** 5 figs., 16 tables, 1 refs. Summary in English, p. 228. **DLC** (G9.C4)—The distribution of snow cover is described in detail on the basis of observations at 25 locations from 1901–1930, and the effects of physiography, especially of relief, on snow precipitation and snow cover depth are analyzed. Data on snowfall amount, number of days with snowfall, first and last days of snowfall, snowfall probability, the average depth and duration of snow cover are tabulated. Maximum snow depth averages about 8 cm in the lowlands, 11–26 cm in the foothills, and 61 86 m in the mountains, lasting about 40–50 60–70, and 150 days, respectively. Snow precipitation increases with elevation about 10 mm/100 m at elevations below 800 m and up to 150 mm/100 m in the mountains. *Subject Headings:* **1. Snow cover distribution 2. Snowfall distribution 3. Bohemia, Czechoslovakia.**—*SIPRE abstract SIP* 15934.

10M–317 551.578.46(436)

†Roller, Maria (*Vienna*), **Schneepegelbeobachtungen im Sonnblickgebiet im Zeitraum 1927 bis 1956.** [Snow depth gage measurements in the Sonnblick region from 1927 to 1956.] *Sonnblick-Verein, Vienna, Jahresbericht*, Vol. 51/53, 1953–1955, pub. **1957.** p. 43–45. table, 12 refs. **DLC**—A table gives the mean snow depths (in cm) at the end of each month for different localities in Austria. The situation of the measuring stations is described and a bibliography of published studies on snow depth observations is appended. *Subject Headings:* **1. Snow cover depth distribution 2. Snow depth measuring stations 3. Sonnblick, Austria.**—*I.L.D.*

10M–318 551.578.46 624.182

Steinhauser, F., **Flächenanteil verschiedener Stufenwerte der Andauer der Schneedecke in Österreich.** [Spatial distribution of different snow cover duration values in Austria.] *Oesterreichische Wasserwirtschaft*, Vienna, 9(7):157–159, **1957.** fig., table, 5 refs. **DLC**—The duration of snow cover is listed for 10 regions of Austria, giving the percentage in area. Almost half of Austria is covered by snow more than 100 days a year. *Subject Headings:* **1. Snow cover duration 2. Austria.**—*A.A.*

10M–319 551.578.46

U. S. Corps of Engineers and U. S. Weather Bureau, Cooperative Snow Investigations, **Annual Progress Report 1951/1952.** Its *Technical Report*, No. 6-6, July **1952.** 29 p. 3 tables. **DWB**—"This report consists of summaries of operations and progress of various activities in the Cooperative Snow Investigation program during the fiscal year 1951–52." The U. S. Weather Bureau Snow Analysis Unit prepared hydrometeorological logs and studies on evaporation from snow, the U. S. W. B. Snow Cover Investigation Unit carried on studies on estimating snow cover; on the definition of "snow line"; on snow density, etc. The Corps of Engineers studied areal snow distribution, heat budget of snow cover, etc. The activities of special projects and the proceedings of the annual conference of the C.S.I. held at the South Pacific Division Office April 1, 1952, are summarized. *Subject Headings:* **1. Snow research 2. Snow cover.**—*I.L.D.*

10M–320 551.578.46(74)

*U. S. Weather Bureau, **Snow cover surveys by Eastern Snow Conference, 1954/1955.** Asheville, **1955.** 18 p. entirely tables. **DWB**—Snow cover data (snow depth and water equivalent in inches for 1 or 2 dates each month) are presented in tables arranged by river basins for upward of 700 stations in New England, New York and Pennsylvania, for each month Dec.–April when snow lay on the ground. Coordinates of each station and cooperating agency are also given. *Subject Headings:* **1. Snow cover data 2. New England 3. New York.**—*M.R.*

10M–321 551.578.46(52)

Yamagata, Japan. Weather Station, **On the chart showing mean depth of snow cover at the city of Yamagata.** *Seppyo* (*Snow and Ice*), Tokyo, 12(1):192–193, **1950.** In Japanese. **DWB**—Daily curves showing the depth of snow cover at Yamagata were constructed for each year since

393. After periodogram analysis, a marked 9-year cycle was found. *Subject Headings:* **1. Snow cover depth 2. Periodogram analysis 3. Yamagata, Japan.**—*H. Arakawa.*

Effects Of Snow and its Control (551.578.46:624)

10M–322 551.578.468

Sakharov, I. M., **Sneg—sredstvo zashchity drevesno-kustarnikovykh rasteniĭ.** [Snow: a means of protecting woody shrubs.] *Priroda*, Moscow, 47(2):97–99, Feb. **1958.** 2 figs. **DLC**—The lower parts of many trees and shrubs are protected by snow from freezing. The temperature underneath the snow cover is considerably higher than above it and the soil under a snow cover of 80 cm is not frozen. The snow cover provides a humid environment so that transpiration is at a minimum. Also considerable light is transmitted. Examples of the protection of plants with snow used in the Principal Botanical Gardens in Moscow are described with the aid of photographs. These include heaping up snow around such evergreens as boxwood, juniper, etc. The extension of the use of snow in plant protection is discussed. *Subject Headings:* **1. Snow cover effects 2. Plant protection by snow.**—*I.L.D.*

10M 323 624.144.4 551.578.467

Saito-Yogo, **Prevention method of cornice formation by wooden fence.** *Researches on Snow and Ice*, Tokyo, No. 1:119–122, Nov. **1953.** 11 figs. In Japanese. Also as: **Prevention of snow cornices by means of board fences.** *Seppyo* (*Snow and Ice*), Tokyo, 11(5):17–22, **1950.** 20 figs. In Japanese. **DWB**—To find the most effective method to prevent cornice formation which might be a cause of avalanches, several types of wooden fences have been tried. An effective way (illustrated in Fig. 7) involves installation of a high barrier on the windward slope and three short fences on either side of the summit (2 on lee and 1 near summit). *Subject Headings:* **1. Avalanche prevention 2. Snow fences.**—*H. Arakawa.*

10M–324 551.578.46:621.316 624.144.22

Shoda, M., **Studies on snow accretion on electric wire and its prevention.** *Seppyo* (*Snow and Ice*), Tokyo, 12(3):282–293, **1950.** diagrs. (incl. photos), tables. In Japanese. **DWB**—Also as: **Studies on snow accretion.** *Researches on Snow and Ice*, Tokyo, No. 1:50–72, 100–107, Nov. **1953.** **DWB**—This is a summary of a study on snow accretion on electric wires. It contains a classification of snow accretion, conditions favorable to snow accretion, adhering force, effects of solar radiation, growing speed, density of accreted snow as a function of scale, and other effects on snow accretion on electric wires. To prevent such accretion on wires it is recommended that they be coated with paraffin or some other chemical. *Subject Headings:* **1. Snow accumulation on wires 2. Snow damage prevention.**—*H. Arakawa.*

10M–325 551.578.46:621.39

Shoda, Mikio, **On the jumping of electric wire caused by falling of accreted snow and ice.** *Researches on Snow and Ice*, Tokyo, No. 1:100–107, Nov. **1953.** 2 figs., 2 photos, table, 5 eqs. In Japanese. **DWB**—The author made experiments for swinging of cables, dropping the loaded weight artificially, etc. Some photographs are included. *Subject Headings:* **1. Snow accumulation on wires.**—*H. Arakawa.*

10M–326 624.144.4 551.578.466

Tanifuji, Shozo and Ogawa, Tetsuo, **Investigations on all-weather roads for snowy districts: experimental studies on snow control.** *Seppyo* (*Snow and Ice*), Tokyo, 13(6):163–179, **1952.** tables, figs., eqs. In Japanese. **DWB**—Instead of dealing with the title of this paper, the authors criticize the theoretical aspects accepted to date and make a survey of the similarity theory of turbulence based on the modern statistical theory. It seems they wish to apply this theory to snow control in areas of deep snow cover. *Subject Heading:* **1. Snow control.**—*H. Arakawa.*

Avalanches (551.578.48)

10M–327 551.578.481

de Quervain, M. R. (*Swiss Snow and Avalanche Res. Inst., Weissfluhjoch, Davos*), **Avalanche classification.** *International Union of Geodesy and Geophysics. Assoc. of Scientific Hydrology, Toronto, Sept. 1957*, [*Transactions*], Vol. 4, pub. **1958.** p. 387–392. **DWB, DLC**—The problem of avalanche classification is much older than that of snow classification. Nearly every scientist, alpinist or alpine writer dealing with avalanches has proposed a separate system. The author of this note wishes to give a survey of various existing avalanche classifications, including a suggestion which has been published by R. Haefeli and himself. Whether or not an effort should be made for

setting up a standard classification may be decided by the commission. *Subject Heading:* **1. Av lanche classification.**—*Author's abstract.*

10M–328 551.578.4

Kuroda, Masao, **Mechanical studies of snow avalanche.** *Researches on Snow and Ice*, Toky No. 1:203–206, Nov. **1953.** ref., 6 eqs. In Japanese. **DWB**—A theoretical speculation on t mechanics of avalanches. *Subject Heading:* **1. Avalanche mechanics.**—*H. Arakawa.*

10M–329 551.578.4

Miyazaki, Kenzo, **Introduction to the study of snow slides.** *Seppyo* (*Snow and Ice*), Toky 14(2):35–65, Sept. **1952.** figs., photos, tables, foot-refs. In Japanese. **DWB**—A thorough revie of avalanche science with quantitative data in tables and graphs and many illustrations, coverin most of the important Swiss and other European literature as well as much native research on effe of slope, orientation, etc., on frequency of slides. A great part of the article is devoted to ski field *Subject Headings:* **1. Avalanche research 2. Ski fields 3. Japan.**—*M.R.*

10M–330 551.578.48

Miyazaki, Kenzo, **A study on classification of avalanche.** *Researches on Snow and Ice*, Toky No. 1:211–214, Oct. **1953.** 7 refs. In Japanese. Glossary in Japanese and English. **DWB** Detailed classification and definition of terms used in avalanche forecasting in Switzerland. *Subje Headings:* **1. Avalanche classification 2. Avalanche forecasting terminology 3. Japanese languag** —*M.R.*

10M–331 551.578.4

Passamonti, Luigi, **Necessità della creazione in Italia di un Istituto per lo studio della nev** [Need for establishing in Italy an institute for the study of snow.] *Geofisica e Meteorologia*, Genoa 3(3):86–90, May/June **1955. DWB**—The history of research on snow and avalanches in Switzerlan France and Italy, in particular since the thirties and forties, is reviewed briefly. The importanc of avalanche prevention in Italy is stressed and Italian studies on snow and methods of avalanch prevention are discussed. *Subject Headings:* **1. Avalanche research 2. Avalanche preventio** —*I.L.D.*

10M–332 551.578.4

Shinoda, Nikichi, **Impact force of avalanche.** *Researches on Snow and Ice*, Tokyo, No. 1:215 217, Nov. **1953.** 3 figs., table, 5 eqs. In Japanese. **DWB**—The impact force of artificial avalanche was measured and tabulated in kg weight/m². *Subject Heading:* **1. Avalanche impact force.**— *H. Arakawa.*

10M–333 551.578.482(498

Stoenescu, St. M., **Condiţiile meteorologice favorabile formării avalanşelor.** [Meteorologica conditions favoring avalanche formation.] *Meteorologia si Hidrologia*, Bucharest, 1(1):51–54, Oct **1956.** 5 figs. **DWB**—The principal typical avalanche situations, namely: a) compaction of snov or surface crust formation followed by the fall of a large quantity of loose snow, and b) sudden ad vective warming when large quantities of snow have accumulated, are briefly explained. Weathe development which led to avalanche activity in Romania in April 1956 is described. Surface pressure and temperature charts are presented. *Subject Headings:* **1. Avalanche formation 2. Ro mania.**—*G.T.*

10M–334 551.578.48

Takahashi, Kihei, **Statistics on avalanches which caused damage.** *Seppyo* (*Snow and Ice*) Tokyo, 12(1):193–198, **1950.** figs., tables. In Japanese. **DWB**—Extensive data and chart show ing snow depth. *Subject Headings:* **1. Avalanche damage 2. Snow depth.**—*M.R.*

10M–335 551.578.483(47)

Tushinskiĭ, G. K., **Snezhnye obvaly.** [Avalanches.] *Vsesoiuznyĭ Geograficheskiĭ S"ezd, 2na Leningrad, 1947, Trudy*, 1:306–313, **1948. DLC** (G56.V8)—Progress in avalanche research in the U.S.S.R. in the last 10 years and the methods of study are discussed. Differences between avalanche classifications abroad and in the U.S.S.R. are pointed out, and the formation of avalanches, determin ing factors, and avalanche characteristics are examined. The author suggests the introduction of systematic mapping of localities in summer when non-avalanche snow begins to disappear and introduces methods of mapping used by him for a number of years. *Subject Headings:* **1. Avalanche research 2. Avalanche forecasting 3. U.S.S.R.**—*A.M.P.*

HAIL (551.578.7)

10M-336 551.578.7(781)

Robb, A. D. (*U. S. W. B., Topeka, Kans.*), **Severe hail, Selden, Kansas, June 3, 1959.** *Monthly Weather Review*, Wash., D. C., 87(8):301-303, Aug. **1959.** 2 photos. **DWB, DLC**—With the aid of photographs the author describes the hailstorm of June 3, 1959 in Selden, Kansas. It was one of the most severe hailstorms in the State's record. In contrast to most severe hailstorms there was little wind and the stones were small. The hailstones fell continuously for 85 minutes. The area covered by the hail was elongated—about 9 miles northeast to southward and 6 miles across at the widest. In addition to the hail about 2 to 5 inches of rain fell. The hail accumulated to a depth of 18 inches. A brief description of the damage is given. *Subject Headings:* **1. Severe storms 2. Hailstorm, Selden, Kans. (June 3, 1959) 3. Selden, Kansas.**—*I.L.D.*

10M-337 551.515.82:551.578.7(52)

§Kurihara, K.; Ueda, T. and Ikeda, T., **Hail and windspout in Kamikawa on 19th June 1952.** *Journal of Meteorological Research Tokyo*, 5(10/12):778-781, Jan. **1954.** 3 figs. In Japanese; English summary p. 782. **DWB**—A description and analysis of a cold frontal rainstorm accompanied by hail (path of small tornado and area of hailfall is shown on a chart of the town of Toma) which occurred in the Kamikawa District of Hokkaido on June 19, 1952. A synoptic chart for 15 h local time is included. Hourly temperature-vapor pressure diagrams for Asahikawa are also included for 18, 19 and 20 June, 1952, showing anomalous conditions at 14 h on 19th. *Subject Headings:* **1. Cold front showers 2. Hailstorms 3. Windspouts 4. Kamikawa District, Hokkaido, Japan.** —*M.R.*

10M-338 551.508.99:551.578.71:531.52

Di Capua, E.; Galli, A. and Pavesi, B., **Apparechhiatura per la misura della velocità e l'osservazione fotografica dei chicchi di grandine cadenti.** [Apparatus for measuring velocity and photographic recording of falling hailstones.) *Rivista di Meteorologia Aeronautica*, Rome, 19(4):41-43, Oct./Dec. **1959.** 4 figs., Italian, French, English and German summaries p. 41. **DLC**—A description with the aid of a circuit diagram and photographs of an apparatus for measuring photographically the velocity of fall of hailstones. The system is essentially a stroboscope having a high intensity of illumination of 200 W and a frequency of 200 Hz which can be reduced easily to 100 Hz. The bulb used is Osram XIE 200 supplied by a current of 2000 V and requiring charge impulses of at least 10,000 V with an energy of at least 300 to 100 mws per impulse. *Subject Headings:* **1. Hailstone fall velocities 2. Stroboscopes.**—*I.L.D.*

10M-339 551.578.71:551.574.1

Soulage, G., **Influence de l'aérosol atmosphérique sur la formation de la grêle, Pt. 1, Pouvoir glacogène de l'air à proximité d'orages à grêle.** [Influence of atmospheric aerosol on hail formation, Pt. 1, Ice forming power of air near hailstorms.] *Puy de Dôme Observatoire, Bulletin*, No. 4:125-146, Oct./Dec. **1958.** 6 figs., 1 table, 19 refs. French and English summaries p. 125-126. **DWB**—To appraise the part played by ice forming nuclei in hail formation, measurements of the ice forming power of air near and inside hail cumulonimbus clouds have been carried out. These measurements were made at −10, −15 and −20°C in mixing cloud chambers in which several types of nuclei could be tested. Some measurements were carried out on the Atlantic coast, others in flat country and mountains (Puy de Dôme: 1460 m) inland. These results show that hailstorms are not due to important temporary deficiencies of ice forming nuclei in the atmosphere. Hail falls can occur under conditions in which the ice forming power of air is normal or even greater than normal (several ice crystals in one liter of air at −15°C). However the majority of the hailstorms occurred with ice forming power smaller in absolute value and lower than the numbers found in thunderstorms without hail. This result is more pronounced with fast nuclei than with fast nuclei and low nuclei taken together. It seems to indicate, though small minima of ice-forming power are not a necessary condition for hail formation, near sources of ice nuclei, high density nuclei swarms can penetrate into clouds, sometimes encouraging, sometimes hindering hail formation. Finally, during the initial stages of the formation of ice, and then of hail, the role played by these nuclei seems to be greater in maritime air than in continental air. *Subject Headings:* **1. Hail formation 2. Hailstorms 3. Freezing nuclei.**—*Author's abstract.*

10M-340 551.578.72(675)

†Bultot, Franz, **Etude statistique des chutes de grêle au Congo Belge et au Ruanda-Urundi.** [Statistical study of hailstorms in Belgian Congo and Ruanda-Urundi.] *Institut National pour l'Etude Agronomique du Congo Belge. Bureau Climatologique, Communications*, No. 17, **1959.** 32 p. 5 figs., 4 photos, 49 refs. **DLC**—Object of this study is to determine the distribution, both in space and time, of probability of hail in the Belgian Congo and Ruanda Urundi. First part supplies a

survey of the recent theories concerned with the setting of hail, the properties of hailstones (shape structure, specific mass, speed and kinetic energy at the end of the fall), the horizontal extension and duration of hail showers and their formation. In the Belgian Congo, hailstones are never big (more often than not their diameter should be inferior to 13 mm) and have but little chance of reaching the ground in regions lower than 800 m in altitude. Second part deals with frequency of hail occurrences, mean yearly risks for hail storms and spatial distribution of hail storms in the Belgian Congo. West of the 23rd meridian, less than 1 hail storm, on the average, is observed in a year. Eastwards, up to the mountainous edge of the "graben" (alt. 1400 m), less than 2 hailshowers are annually recorded, and in the area bordering on Albert and Edward Lakes, one notes annually 3 hail showers at altitudes superior to 1800 meters. In the mountainous countries of the Kivu Basin and on the Congo-Nile ridges, probability of hail varies with altitude; one counts annually, on the average, as much as 9 and more hail showers. Hail probability shows an important seasonal variation as it is put into evidence on charts supplying the monthly mean frequencies. These charts are explained from the ecological point of view, and author examines incidence of this seasonal variation on the cultural cycles. Last part recalls shortly the up-to-date prevention techniques recommended against hail. It seems that every hail-prevention attempt in the Belgian Congo would be premature. *Subject Headings:* **1. Hail distribution 2. Hail frequencies 3. Hail probability 4. Hail prevention 5. Belgian Congo.**—*A.V.*

HYDROLOGY AND HYDROMETEOROLOGY (551.579)

GENERAL

10M–341 551.579

Balek, Jaroslav, **K Otázce volby representačního období při zpracování hydrologického materiálu.** [The problem of selecting a representative period for the analysis of hydrological data.] *Meteorologické Zprávy*, Prague, 12(1):24–26, **1959.** 4 figs., 9 tables, 3 refs. Russian and English summaries p. 24. **DWB, DLC**—The results of this study are based on 130 years observations of water stages on the Vltava River in Prague. The periods of 10 and 15 years are chosen, during which the development of water stages characterizes the river in the same way as the long period. The results for the Vltava section in Prague are applied to the other remarkable hydrological sections. *Subject Headings:* **1. Hydrologic analysis 2. Vltava River, Czechoslovakia.**—*Author's summary.*

10M–342 551.579:519.244

Brakensiek, D. L. (*Soil and Water Conserv. Res. Stat. U. S. Dept. Agr., Coshocton, Ohio*), **Fitting a generalized log-normal distribution to hydrologic data.** *American Geophysical Union, Transactions*, 39(3):469–473, June **1958.** 4 figs., 2 tables, 6 refs., 9 eqs. **DWB, DLC**—A statistical distribution is developed which makes it possible to fit a wide range of positively skewed hydrologic data. It is shown that the general least-squares fitting equations will reduce to simple forms for fitting a normal, log-normal or extreme-value distribution to data. Two fitting processes are developed for fitting data by the so-called generalized log-normal distributions. Examples are given for illustrating the fitting procedures. *Subject Heading:* **1. Hydrologic analysis.**—*Author's abstract.*

10M–343 551.579

Coutagne, Aimé, **Comment caractériser la variabilité périodique d'un facteur hydrologique.** [How to characterize the periodic variability of a hydrological factor.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957*, [*Transactions*], Vol. 3, pub. **1958.** p. 280–291. 5 figs., 2 tables. French summary, p. 280. **DWB** (M(06) 1611g)—Several remarks and conclusions are reached on the method of characterizing the periodic variability of hydrological factors. Many years of observation of the Mississippi, the Rhine, the Nile, particularly from the annual precipitation data in the area, have led to these opinions. *Subject Heading:* **1. Hydrologic variability.**—*N.N.*

10M–344 551.579

*Coutagne, Aimé, **Etude des caractéristiques et des correlations ou covariations hydrométéorologiques d'un bassin fluvial, illustrée par un cas concret: la Tamise à Teddington.** [Study of the characteristics of the hydrometeorological correlations or co-variations of a river basin, illustrated by a concrete case: the Thames at Teddington.] *I.U.G.G. Association of Scientific Hydrology, Brussels*, 1951, [*Transactions*], Vol. 3, **1952.** p. 201–220. 5 tables, 4 figs., eqs. **DWB**—A sample of an extensive "hydrometeorological monograph" for a river basin, based on the period 1883–1934. Mean monthly data for precipitation, runoff, temperature and tank evaporation. Seasonal retention computed according to lysimeter observations. Relationships between precipitation, runoff and temperature are established for single months, seasons and years and the variability of these values

's discussed. Samples for a few European and American rivers show that the correlation between annual precipitation and runoff is much stronger for a year beginning with May or June, rather than for the usually adopted hydrologic year. Furthermore, formulas for the total runoff from snowmelt are proposed and tested for some U. S. rivers. *Subject Headings:* **1. Hydrologic cycle 2. Thames River, England 3. Europe 4. United States 5. Lebanon.**—*A.A.*

10M–345 551.579(438.1)

*Debski, Kazimierz (*SGGW-Warszawa*), **Współczynniki zmienności w basaniach potamologicznych.** [Coefficients of variability in potamology investigations.] *Przeglad Geofizyczny*, Warsaw, 1(3/4):215–227, **1956.** 5 figs., 8 tables. French summary p. 226–227. **DWB, DLC**—Coefficients of variability are presented (tables and graphs) and discussed for the following elements in the Vistula Basin: annual mean temperature, pressure, precipitation, runoff and ground water storage. Relations between variabilities of the different elements are examined. *Subject Headings:* **1. Hydrometeorology 2. Vistula Basin, Poland.**—*G.T.*

10M–346 551.579

Dhir, R. D. (*Dir. Central Water and Power Commission*), **The hydrological balance and the influence of utilization of ground water upon it.** *Irrigation and Power*, Simla, 9(3):433–437, July **1952.** fig., 3 refs. **DWB**—General discussion of the participation of maritime and continental air masses in the hydrologic cycle, the effect of evapotranspiration and infiltration, ground water utilization and changes in stream runoff. *Subject Headings:* **1. Hydrologic cycle 2. Hydrometeorology.**—*A.A.*

10M–347 551.579:551.573:581.11

Dienert, F., and Hénin, S., **Du bilan de l'eau.** [The water balance.] *I.U.G.G., International Association of Scientific Hydrology, Oslo 1948*, [*Transactions*], 1, [**1951**]. p. 107–115. 2 figs., tables. **DWB**—Report on lysimeter investigations of the seasonal distribution of evaporation and infiltration. In the second part of the paper the formula $E = p/1 + \gamma p^2$ for annual values is analyzed in detail, where E = evapotranspiration; p = precipitation; and $\gamma = (0.15t - 0.13)^{-1}$ (t = temperature in °C). Good agreement with observed values, presented graphically. The maximum possible evapotranspiration for a given climate is $E \max = \frac{1}{2}\sqrt{1/\gamma}$. It is shown that the quantity is closely related to the aridity factor of DE MARTONNE. Use of a similar formula for monthly evapotranspiration is proposed. *Subject Headings:* **1. Evapotranspiration 2. Hydrologic cycle 3. Aridity.**—*A.A.*

10M–348 551.579

Dilloway, A. J., **Hydrologic analysis and the requirements of international studies.** *I.U.G.G. Association of Scientific Hydrology, Brussels, 1951*, [*Transactions*], Vol. 3, **1952.** p. 197–200. 10 refs. **DWB**—Internationally standardized concepts and methods of measurement are necessary in order to make full use of local observations establishing large-scale relationships between precipitation and runoff. The evaluation of gross water power potential for Central Europe on the basis of rainfall distribution is discussed as a sample. *Subject Headings:* **1. Hydrologic cycle 2. International standardized observations 3. Central Europe.**—*A.A.*

10M–349 551.579(45)

[Italy.] Central Hydrographic Service, **Precipitation, run-off and losses of the Italian drainage areas.** *I.U.G.G. International Association of Scientific Hydrology, Oslo, 1948*, [*Transactions*], 1, [pub. **1951**]. p. 117–128. 7 figs., refs., table. **DWB**—Maps for annual rainfall, water loss and runoff coefficient, and annual data for 38 catchment areas presented for Italy. Seasonal variation of precipitation and water loss is shown, and the relationship between annual values of precipitation, temperature and runoff ratio is graphically derived using data from some 100 river basins. Apparent negative water losses are computed for some mountain areas. *Subject Headings:* **1. Hydrologic cycle 2. Hydrologic charts 3. Italy.**—*A.A.*

10M–350 551.579:622.331

Ivanov, K. E. and Bavina, L. G., **Issledovanie gidrologicheskikh usloviĭ sushki frezernogo torfa na profilirovannykh i neprofilirovannykh kartakh.** [Investigation of hydrological conditions of peat drainage in vertical and non-vertical cuts.] *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy*, No. 60:98–106, **1957.** 2 tables, 2 eqs. **DWB**—The results of an investigation of the water balance components (evaporation, runoff, precipitation) in vertical cuts (those with a convex surface) and level cuts of peat extraction fields in order to determine the physical reasons for the greater seasonal extraction of the former, as compared with the latter. The equation of the water balance of the milling layer is— $DW/Dt = Q_s + Q_e + Q_{co} \ldots + Q_{ci} - Q_p$; where DW = rate of change of moisture of peat cutting with time; Q_s = intensity of surface runoff; Q_e = intensity of evaporation; Q_{co} = intensity of capillary outflow into the peat deposit; Q_{ci} = intensity of capillary inflow into the

peat cutting from the underlying peat deposit, and Q_p = intensity of atmospheric precipitation. Evaporation from the cuttings was determined by the equation $E = \frac{R_b - Q_h}{60\,[1 - 0.64(Dt/De)]}$, where R_b = radiation balance; Q_h = heat influx into the soil; Dt = air temperature difference between 0.5 and 2.0 met above soil surface, and De = absolute humidity difference for corresponding altitudes. The results of measurements indicate that surface runoff is lacking on both vertical and horizontal cuttings; the evaporation intensity from a peat cutting is determined by the radiation balance during the period of peat drying there is no capillary flow from the peat. As a result of the poor wetting capacity, the moisture from rain is retained completely in the milling layer, the intensity of capillary flow of moisture to the milling layer from the underlying surface is several times greater on a horizontal than vertical surface; the rate of desiccation of the milled layer is determined by the intensity of the downward moisture flow towards it, and the less the flow the greater the drying. the increased drying rate of vertical cuttings is the result of the destruction of the capillary connections with the underlying peat layers and not the result of the convex profile acquired by the cutting during melting. *Subject Headings:* **1. Peat microclimatology 2. Peat hydrology.**—*Author's conclusion and I.L.D.*

10M–351 551.579(82) 551.511:551.577

*†Jagsich, Juan, **Régimen hígrico de nuestra atmósfera.** [Hydrologic cycle of the atmosphere.] *Revista Meteorológica*, Montevideo, 13(47):73–104, Dec. **1954.** 12 figs., tables, 26 refs., 15 charts separately bound, and laid in. Also issued as *Cordoba. Universidad Nacional. Facultad de Ciencias Exactas Fisicas y Naturales, Serie Ingenieria Civil*, No. 3, Sept. **1954. DWB**—This issue is entirely devoted to a reprinting of a monograph on all phases of the hydrologic cycle in Argentina. Chapters discuss 1) measurement of evaporation, 2) turbulent diffusion of water vapor, 3) calculation of specific humidity in space, 4) gradient of specific humidity in troposphere, 5) amount of moisture diffused into space, 6) regional variations in evaporation in Argentina, 7) moisture balance in vertical motions, 8) river basins in Argentina, 9) annual cycle of aridity and humidity, 10) application to forecasting, etc., 11) new index of aridity, 12) oceanic sources of vapor, 13) flux of vapor, 14–15) amount and annual variations in vapor transport, 16) vegetative influence. Isohyetal charts of all types are included in separate. *Subject Headings:* **1. Hydrologic cycle 2. Water vapor transport 3. Argentina.**—*M.R.*

10M–352 551.579:061.4(497.1)

Joksimović, Milušin, **Karakteristične vode.** [Water types.] *Yugoslavia. Hidrometeorološka Služba, Hidrometeorološki Glasnik*, 1(2):104–110, **1948.** fig., table, diagr. In Serbian. **DWB**—A short description of hydrological terms used in recording or reporting water levels and runoff on rivers. The author analyzed the content of hydrological reports, need for hydrotechnical projects and presented as an example a similar analysis for a point on the river Uvats (right tributary of Lim), which includes: a table of yearly data for the period 1925–1940, a graph with mean annual values and a mathematical analysis of the variations and the curves of distribution. *Subject Headings:* **1. Hydrological terminology 2. Water level variations 3. Runoff 4. Yugoslavia.**—*N.T.Z.*

10M–353 551.579:628.1(73)

†Paulsen, C. G. (*Water Resources Div., U. S. Dept. of Interior, Washington, D. C.*); Petit, K. G. and Fraser, D., **Current concepts in appraisal of water resources.** (In: United Nations Scientific Conference on the Conservation and Utilization of Resources, Lake Success, N. Y. 1949, **Proceedings,** v. 4, Water Resources, pub. **1951.** p. 37–39. bibliog.) **DWB**—A brief general review of current problems with 22 references to publications which give an introduction to the principles, methods and equipment currently used in the appraisal of the water resources in the United States. *Subject Headings:* **1. Water resources 2. United States.**—*A.A.*

10M–354 551.579:912(485)

Slettenmark, Gustaf, **Hydrology of Sweden.** International Union of Geodesy and Geophysics, *I.U.G.G. Association of Scientific Hydrology, Oslo, 1948*, [*Transactions*], Vol. 1, [**1951**]. p. 15–25. 17 figs. **DWB**—Reproduction of maps show percentage of lakes, annual precipitation, snow and ice conditions, discharge, evapotranspiration, available water power and river load. Lake temperature and annual variation of water levels in rivers are shown. *Subject Headings:* **1. Hydrologic maps 2. Sweden.**—*A.A.*

10M–355 551.579:551.501.3

Smetana, Jan, **La standardisation des caractéristiques hydrologiques des cours d'eau et le cadastre des grandes rivieres.** [Standardization of the hydrologic characteristics for water courses and the cadaster of great rivers.] *I.U.G.G. International Association of Scientific Hydrology,*

Brussels, 1951, [*Transactions*], Vol. 3, **1952.** p. 165–168. **DWB**—A list of symbols for desirable precipitation and runoff characteristics is proposed for the use in an international river cadaster. The construction of 37 different maps and graphs is proposed, including temperature maps, 18 maps covering different aspects of precipitation, 6 topographical and soil maps, and 5 runoff and evapotranspiration maps. No proposals are made for morphometric indexes. *Subject Headings:* **1. International river cadaster 2. Hydrologic symbols.**—*A.A.*

10M–356 551.579(71)

Stichling, W. and Blackwell, S. R. (*both, Prairie Farm Rehabilitation Administration, Regina, Saskatchewan, Canada*), **Drainage area as a hydrologic factor on the glaciated Canadian prairies.** *International Union of Geodesy and Geophysics. I.U.G.G. Association of Scientific Hydrology, Toronto, Sept. 1957,* [*Proceedings*], Vol. 3, pub. **1958.** p. 365–376. 6 figs., 8 refs. **DWB** (M(06) I611g)—On the Canadian Prairies glaciation has created a great deal of depressional storage in most watersheds. The amount of runoff required to fill the available storage each year is a function of previous runoff and climatic conditions; hence areas which contribute to runoff at a downstream point one year may not contribute in another. Consequently, the drainage boundaries of these watersheds change periodically. This paper describes the problem and discusses some of its applications to hydrological investigations. *Subject Headings:* **1. Storage effects on runoff 2. Runoff from variable drainage areas.**—*Authors' abstract.*

10M–357 551.579(47)

Tsinzerling, V. V., **Vnutrennii vodooborot, preobrazocanie prirody i uluchshenie klimata SSSR.** [Interior water circulation, transformation of nature and improvement of climate in the U.S.S.R.] *Voprosy Geografii,* Moscow, No. 23:223–230, **1950. DLC**—General discussion of the hydrologic cycle over the continent of Eurasia, especially the arid regions of Central and Southern U.S.S.R. Quantitative values are given for total rainfall, runoff, etc. over continental part of the U.S.S.R. It is emphasized that the water may evaporate and fall several times in its course from the ocean to the interior. Possibility of artificially increasing the moisture exchange in the U.S.S.R. is discussed. *Subject Headings:* **1. Hydrologic cycle 2. Moisture exchange 3. U.S.S.R.**—*M.R.*

10M–358 551.579(030.8)

United Nations Economic Commission for Asia and the Far East, **Glossary of hydrologic terms used in Asia and the Far East.** Its *Flood Control Series,* No. 10, pub. Bangkok, **1956.** 38 p. Price, $0.40. **DWB.** *Subject Heading:* **1. Hydrologic glossaries.**

10M–359 551.579:016(73)

†U. S. Geological Survey, **Bibliography of miscellaneous publications on surface waters in the Arkansas-White-Red River Basins.** Prepared for the Water Resources Work Group, Arkansas-White-Red Basins Inter-Agency Committee, May **1952.** 10 p. Mimeographed. **DWB**—The bibliography lists U. S. Geological Survey Water-supply papers, special reports by the U. S. Weather Bureau, reports published by state agencies of Arkansas, Colorado, Kansas, Louisiana, Missouri, New Mexico, Oklahoma and Texas, and a few other papers dealing with surface water supplied (floods, river stages, water temperature, etc.) in the Arkansas-White-Red River Basins. There are 72 papers listed (1897–1952), most of them with brief annotations as to contents of paper. *Subject Headings:* **1. Floods 2. Water supply 3. Hydrologic bibliographies 4. Arkansas River Basin.** —*M.R.*

10M–360 551.579(584.6)

Uryvaev, V. A., **O resursakh poverkhnostykh vod severnykh oblasteĭ Kazakhstana.** [Surface water resources of the northern regions of Kazakhstan.] *Meteorologiia i Gidrologiia,* Leningrad, No. 3:3–14, March **1957.** 5 figs., 3 refs. **DWB, DLC**—The scope of the study of the surface water resources of Northern Kazakhstana carried out over a period of 2 yr by the Central Geophysical Institute is described. The results of the field work cover the determination of normals of river runoff, the relation of runoff to elevation, the calculations of a coefficients of variation of annual runoff, the determination of the parameters of the equation:

$$c_i = \frac{a - b \log (F+10)}{(h+1)^n}$$

(F = area of catchment and h = runoff layer, a, b, n = parameters), calculation of maximum runoff, effect of cultivation of virgin lands upon runoff, the relationship of the capacity of ponds to the volume of normal flow and amount of alluvium deposited from unit area of the catchment, evaporation from the surface of reservoirs during the ice-free period, etc. Maps with isolines of runoff normals, with isolines of the coefficients of variation of annual river runoff and with isolines of

evaporation from the surface of reservoirs, etc. are presented. *Subject Headings:* **1. Surface runo 2. Water resources 3. Kazakh S.S.R.**—*I.L.D.*

10M–361 551.579(564.3) 551.577(564.3

Ward, Ivan Lee; McGregor, David Patrick and Grehan, Michel (*all, Dept. of Water Develop ment, Cyprus*), **Hydrology and water development in Cyprus.** *Institution of Civil Engineers, London Proceedings*, 9:233–258, March **1958.** 17 figs. (incl. photos), 4 tables. **DLC**—Besides a discussion with detailed illustrative maps and diagrams of the topography, geology and water resources o Cyprus, the hydrological cycle in the several sections, modification by forests, soil conservation engineering developments, conservation, artificial recharging, waste of water by evaporation and by evapotranspiration, surface and from non-productive vegetated and underground losses to sea inefficient irrigation practices, etc., are evaluated and future developments to increase efficiency are discussed. The rainfall is shown by an isohyetal map based on 1911–1953 data. Average annual rainfall ranges from <12 in. to >40 in. (mean 19.44 in.). Almost half of the precipitation falls in Dec. and Jan. *Subject Headings:* **1. Water resources 2. Hydrologic cycle 3. Isohyeta charts 4. Cyprus.**—*M.R.*

HYDROLOGICAL RESEARCH (551.579)

10M–362 551.579(410)

[Allard, W.], **Report by Mr. W. Allard (Great Britain),** *International Union of Geodesy and Geophysics, I.U.G.G. Association of Scientific Hydrology, Oslo, 1948,* [*Transactions*], Vol. 1, [pub **1951**]. p. 60–61. refs. **DWB**—Short report on hydrological activity in Great Britain, giving references to recent papers on turbulent transfer of moisture, evaporation and percolation. Annual rainfall and runoff data given for five catchment areas. *Subject Headings:* **1. Hydrologic research 2. Hydrologic cycle 3. Great Britain.**—*A.A.*

10M–363 551.579(94)

Hills, E. Sherbon, (*Prof. of Geology. Univ. of Melbourne*), **Hydrology.** *Australian Journal of Science*, Sydney, 19(3):103–104, **1956. DLC**—An outline of hydrological studies is presented. Although Australia is critically dependent on water resources, hydrologic research is lagging even behind "underdeveloped" countries. *Subject Headings:* **1. Hydrologic research 2. Australia.**—*A.A.*

10M–364 551.579(773)

Illinois. State Water Survey, **History and activities of the Illinois State Water Survey, 1957.** 26 p. photos. **DWB** (M79 O29hi)—The facilities, organization and history of the Illinois State Water Survey since 1895, water resources and records for Illinois, the work of the meteorology section and its quarters, and past and current activities (including radar and raingage networks and sampling) and personnel (in meteorology 25 meteorologists and aides are listed under the supervision of GLENN E. STOUT) are outlined and illustrated in this pamphlet. *Subject Headings:* **1. Illinois State Water Survey 2. Hydrometeorological research 3. Urbana, Illinois.**—*M.R.*

10M–365 551.579(410)

Johnson, Nelson, **Potamology in the United Kingdom.** *International Union of Geodesy and Geophysics, Association of Scientific Hydrology, Oslo, 1948,* [*Transactions*], Vol. 1, [pub. **1951**]. p. 152–153. eq. **DWB**—General report on hydrological activity in Great Britain, giving also information on some recently developed relationships between meteorological conditions and evaporation from free water sources or catchment areas. Mean monthly rainfall and runoff given for the Thames River. *Subject Headings:* **1. Hydrologic research 2. Evaporation 3. Hydrologic cycle 4. Thames River, England 5. Great Britain.**—*A.A.*

10M–366 551.579(764) 551.579

Johnston, J. R. (*U. S. Dept. of Agric. Bushland, Texas*), **The significance of a water budget for Texas.** *Texas. A. and M. College, College Station, Proceedings of the 3rd Annual Conference on Water for Texas, Sept. 1957,* [issued **1958?**]. p. 7–10. 2 figs., 5 tables. **DWB** (M79 C748pro), **DLC** (TD201.T37)—At the 1955 Water for Texas Conference a preliminary water balance was presented. It was developed for the specific purpose of pointing out major problems and opportunities for making more effective use of their water income. The author points out the significance of a water budget for specific manageable units in relation to the State's total water situation. *Subject Headings:* **1. Water budget 2. Hydrologic research 3. Texas, U. S.**—*N.N.*

10M–367 551.579

Kuz'min, P. P., **Hydrophysical investigations of land waters.** *I.U.G.G. Association of Scientific Hydrology, Toronto, Sept. 1957,* [*Proceedings*], Vol. 3, pub. **1958.** table. **DWB** (M(06) I611g)—

The rapid development of hydraulic works, agriculture, transport and other branches of the national economy in the USSR makes great demands on hydrology. The elaboration of hydrological calculation and prediction methods calls for the continuous improvement of our knowledge of natural waters—of water reservoirs and processes related to them, of the water regime of different soils, of arable lands, and river basins. Hydromechanical processes (currents, waves) and thermal processes related to the heat exchange between reservoirs and surroundings (cooling and heating, freezing and breaking up of reservoirs, melting of snow and ice, evaporation and condensation) are of greatest importance when studying reservoirs. These processes are examined in hydrophysics. The question of infiltration (percolation), evaporation from land and physical properties of water, snow and ice are closely associated with hydrophysics. In this report only some questions of hydrophysics are studied, namely: the evaporation from land and water surfaces, ice formation and snow melting occurring as a consequence of the heat exchange process and representing, in essence, the transition of water from one aggregate condition to another. These questions are of great scientific and practical importance and occupy a significant place in hydrophysical investigations. *Subject Headings:* **1. Hydrophysics 2. Hydrologic research.**—*Author's abstract.*

10M–368 551.579(436)

Lernhardt, Alfred, **Methodology of the Austrian Waterpower Register.** (In: United Nations Scientific Conference on the Conservation and Utilization of Resources, Lake Success, N. Y. 1949, **Proceedings,** v. 4, Water Resources, pub. **1951.** p. 42–45.) **DWB**—A historical review and a short description of a detailed waterpower register, which will give ample hydrologic, hydraulic and bibliographical information, important also for meteorologists (hydrologic cycle). The total cost for the completion of a river-basin survey, including new measurements, vary from 20,000 to 50,000 shillings. The new register is in preparation since 1946. *Subject Headings:* **1. Hydrologic research 2. Water resources 3. Austria.**—*A.A.*

10M–369 551.579(09)

†Meigs, Peveril, III, **Geographical study of water on the land.** (In: James, P. E. and Jones, C. F. (eds.), **American Geography.** Syracuse Univ. Press, **1954.** p. 396–409. 57 refs.) **DWB**—Hydrology is discussed from the point of view of the geographer and the major contributions during the past 50 years in the fields of general hydrology, geomorphological aspects, data sources, precipitation, stream flow, limnology, ground water hydrology, cryology (snowfall, glaciers and ice), evaporation and transpiration. The areal studies which have been made for the United States, though few, are briefly reviewed. *Subject Headings:* **1. Progress in hydrology 2. Geographical aspects of hydrology 3. United States.**—*M.R.*

10M–370 551.579(485)

Melin, Ragnar, **Scientific hydrological activity in Sweden 1948–51.** *I.U.G.G. Association of Scientific Hydrology, Brussels, 1951,* [*Transactions*], Vol. 1, **1952.** p. 72–74. **DWB**—Report on recent research and scientific papers on the regime of surface and subterranean waters, glaciers, ice conditions of lakes, rivers and the sea, and the distribution of snow. *Subject Headings:* **1. Hydrologic research 2. Sweden.**—*A.A.*

10M–371 551.579(438)

Poland. Państwowy Instytut Hydrologiczno-Meteorologiczny, **Les travaux hydrologiques en Pologne et leur organisation.** [Hydrological studies in Poland and their organization.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957,* [*Transactions*], Vol. 3, pub. **1958.** p. 360–364. **DWB** (M(06) 1611g)—A list of the different Polish departments and institutions engaged in hydrological development is given. The report gives an outline of the particular areas of research wherein these organizations devote their attention. *Subject Headings:* **1. Hydrologic research 2. Poland.**—*N.N.*

10M–372 551.579(931)

Schnackenberg, Ellis C. (*New Zealand*), **Difficulties in obtaining and presenting hydrologic data.** *I.U.G.G. International Association of Scientific Hydrology, Brussels, 1951,* [*Transactions*], Vol. 3, **1952.** p. 502–511. table (fold.), 16 refs. **DWB**—General review on hydrologic activity in New Zealand, discussing rainfall and runoff, river load, hydrometric measurements, etc. A standard methodology is suggested in order to facilitate the international use of hydrologic data. *Subject Headings:* **1. Hydrologic research 2. New Zealand.**—*A.A.*

10M–373 551.579(44)

Serra, L., **Rapport de la Section d'Hydrologie Scientifique.** [Report of the Section of Scientific Hydrology.] *Comité National Français de Géodésie et Géophysique, Comptes Rendus,* 1957:173–178,

pub. **1958.** **DWB**—Account of the French activity in the various fields of physical oceanograph during the year 1957. Among the works relating to surface waters, the report examines successivel those concerned with: the working of the network of gaging stations, hydrological studies, studies c floods, precipitation, and continental erosion. Then the author mentions the nivo-glaciologica studies, the studies relating to underground waters and the works undertaken in the research es tablishments and in the laboratories. *Subject Headings:* **1. Hydrologic research 2. France.**—*A.V.*

10M–374 551.579(52

†Sugawara, Ken (*Chemical Inst. Faculty of Science, Nagoya Univ., Japan*), **National report on hydrology—Japan.** *I.U.G.G. International Association of Scientific Hydrology, Brussels, 1951* [*Transactions*], Vol. 1, pub. **1952.** p. 45–57. 57 refs. **DWB**—Report lists 38 institutes carrying out hydrologic research and 21 journals where hydrologic papers may be found. Abstracts of recen papers, given in the report, are mostly limited to the chemistry of inland waters. *Subject Headings* **1. Hydrologic research 2. Japan.**—*A.A.*

10M–375 551.579(47

Uryvaev, V. A. and Chebotarev, A. I., **Issledovaniia v oblasti gidrologii sushi za 40 let.** [40 years of investigations of land hydrology.] *Meteorologiia i Gidrologiia*, Leningrad, No. 11:41–50 **1957. DWB, DLC**—After the reconstruction of the hydrological network and the resumption of research on water resources after the Second World War, methods were developed for improving and extending the hydrological network and systematizing the accumulated hydrometric data. instructions for studying the regime of the various hydrological elements were prepared and hydrological apparatus was developed. In the field of hydrography a cadastral water survey was made, which resulted in numerous and extensive studies of the rivers, lakes and marshes of the USSR; which were not merely descriptive but also included quantitative analysis of the regime of the individual hydrological elements, the formation of runoff, river freezing, mathematical statistical analysis of hydrological data, calculation of maximum rainfall and snow runoff from basins of various sizes, etc. Extensive research has been carried out on the structure of river flow and the processes of channel formation, these included the laws of turbulent mixing and of the action of turbulent flow upon movable bottom particles, formation and movement of sand waves, the formation of channel morphology (ox-bows, rapids, etc.), experimental studies on river flow, etc. Hydrophysical investigations which include the physical properties of ice and snow. snow melt processes, evaporation of water from the land surface, wind waves, etc. are being carried out. Finally, considerable research is being conducted on the chemical and mineral properties of surface waters in steppe and forest zones, the hydrochemical properties of water during the flood stage, etc. The names of the important investigators in hydrology and the titles of some of the more important monographs are listed. *Subject Headings:* **1. Hydrologic research 2. U.S.S.R.**—*I.L.D.*

10M–376 551.579(09)

†Velikanov, M. A., **Raboty sovetskikh geofizikov po problemam gidrologii sushi.** [The work of Soviet geophysicists on the problem of the hydrology of land areas.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 11:1384–1388, **1957.** 48 refs. **DWB**—The history of hydrology in the U.S.S.R. before and after the October Revolution is outlined briefly and hydrology is classified into three fundamental fields: geophysical, geographical and engineering hydrology. The field of geophysical hydrology deals with the following six types of problems: dynamics of water masses (channel turbulence, movement of ground water, etc.); the thermal balance of reservoirs and water bodies; formation of river flow; channel processes; and the methods of mathematical statistics as applied to flow computation. The contributions by Soviet scientists in these fields of geophysical hydrology and the names of the scientists are cited. *Subject Headings:* **1. History of hydrology 2. Geophysical hydrology 3. U.S.S.R.**—*I.L.D.*

METHODS OF COMPUTATION (551.579:551.501)

10M–377 551.579:519.2

Alekseev, G. A., **O formulakh perekhoda ot obespechennosti gidrologicheskikh velichin k ikh povtoriaemosti vo vremeni.** [Formulas for transition from confidence limits of hydrological values to their frequency in time.] *Meteorologiia i Gidrologiia*, Leningrad, No. 3:42–43, March **1956.** table, 3 refs., 6 eqs. **DWB, DLC**—Together with the confidence p characterizing the probability of the annual excess Q it is necessary to calculate the average number of times of excess per year $\bar{s}$ of a given magnitude Q calculated by $\bar{s} = S/n$, where S is the total number of excess of quantity Q over n-years. For the confidence limit $p > 0.5$, the formula $p^* = 1 - p \approx 1/N^*$ is recommended which is derived from the theoretical formula $p^* = 1 - e^{-S^*} = 1 - e^{-1/N^*}$. Formulas for $p < 0.5$ and for $p = > 0.9$

are given. A table giving the relative error of the approximate formula is presented. *Subject Headings:* **1. Hydrological formulas 2. Confidence limits.**—*I.L.D.*

10M–378 551.579:519.2

Alekseev, G. A., **O krivykh istoshcheniia stoka.** [Curves of runoff depletion.] *Meteorologiia i Gidrologiia*, No. 10:41–45, Oct. **1956.** 2 tables, 6 refs., 18 eqs. **DWB, DLC**—The runoff depletion curves are analyzed mathematically primarily on the basis of the work of Robert Horton. The condition under which the curves are either parabolic, hyperbolic or exponential are considered and calculated data are presented. *Subject Heading:* **1. Runoff depletion curves.**—*I.L.D.*

10M–379 551.579:512

Befani, A. N., **Voprosy teorii i rascheta stoka.** [Problems in the theory and calculation of runoff.] *Meteorologiia i Gidrologiia*, Leningrad, No. 12:6–15, **1957.** 3 tables, 3 refs., 25 eqs. **DWB, DLC**—In connection with the twenty-fifth anniversary of the Odessa Hydrometeorological Station, the author summarizes the most important contributions of the Department of Hydrology to the theory of runoff and the genetic calculations of its elements. After a general discussion of the theory of runoff formation, the equation of water balance and of the calculation of flow due to atmospheric waters are examined including equations (and their derivations) relating to the computation of runoff. These comprise absorption and the equations for the simplest (linear) pattern of microrelief, the equation characterizing the influence of preceding hydrometeorological conditions upon absorption and runoff, absorption intensity of ordinary, slightly eroded (cultivated) black soil, and of chestnut soils, and absorption intensity of melt waters; the equation for computing elementary runoff or the difference between precipitation and melt water on the one hand and losses during the same period; the equation for slope runoff, including complete and incomplete runoff, equation for stream runoff, equation for torrential runoff, including rapid, developed, slowed and multiple runoff; the equation for spring runoff; and equations for seasonal and annual runoff. *Subject Headings:* **1. Runoff calculations 2. Runoff.**—*I.L.D.*

10M–380 551.579:551.501

Bose, N. K. (*River Dir. Res. Inst., West Bengal*), **Hydrology.** *National Institute of Sciences of India, Delhi, Proceedings*, 16(6):421–429, Nov./Dec. **1950.** table, graph, 2 refs. Abstracted from reprint. **DWB**—Deals mainly with the surface runoff ratio for computing current runoff from rainfall utilizing also the unit hydrograph method. Example given for the Barakar catchment. *Subject Headings:* **1. Runoff · 2. Unit hydrograph 3. Barakar catchment, India.**—*A.A.*

10M–381 551.579:551.501.45

Bydin, F. I., **Transformirovanie velichin atmosfernykh osadkov v gidrologicheskie kharakteristiki.** [Transformation of precipitation values into hydrological indexes.] *Vsesoiuznyĭ Geograficheskiĭ S"ezd, 2nd, Leningrad, 1947, Trudy*, 2:290–296, **1948.** 4 figs., 3 tables. **DLC**—A new approach to the question of evaluating the runoff of precipitation waters, which is usually unsatisfactorily computed, is presented and its applicability is shown by a series of examples. The method enables one to evaluate the phenomenon of precipitation runoff, continuously and jointly (without separating surface from underground runoff) in other words—the integral runoff. The numerical criteria of each individual catchment basin are specific because there are no similar basins in regard to soil, relief, vegetation, climate, etc. The method of representing these numerical indexes is the following: 1) precipitation and runoff are presented graphically, for greater clearness, on a general time scale (the time scale and amounts of precipitation and runoff must be so selected as to be easily surveyed), 2) precipitation which does not runoff immediately after falling (snow) is summed up for the corresponding period and is referred to the time of its actual runoff; 3) in redistributing the precipitation of every period on a much longer term of its runoff, one establishes by way of analyses, the corresponding numerical coefficients of influence by which precipitation must be multiplied in order to obtain the runoff. Examples of such computations for catchment basins with surfaces from 1.5 million sq km to 1000 sq km, namely, the Caspian Sea, a lake, a large river, and a small river, are presented and explained. *Subject Headings:* **1. Runoff evaluation 2. Hydrologic indexes 3. Precipitation amount 4. Caspian Sea.**—*A.M.P.*

10M–382 551.579:519.2

*Cebulak, Kasimierz, **Graficzno-analityczne wyznaczanie krzywych hydrologicznych wyrownanych metoda krakowianowa.** [On graphical-analytical determination of hydrologic curves equalized by means of the Cracovian method.] *Acta Geophysica Polonica*, Warsaw, 1(3/4):171–186, **1953.** tables, graphs, 5 refs. In Polish; English summary p. 184. **DWB**—It is shown how to compute equations for rainfall depth duration curves and discharge curves without applying the method of least squares. The simplification is achieved by graphical equalizing and smoothing.

The Cracovian method is specially suitable for points lying in equal distances along the vertical axis. *Subject Headings:* **1. Rainfall depth duration curves 2. Runoff 3. Equalization methods 4. Cracovian method.**—*A.A.*

10M–383 551.579:519.2

Dichev, D., **Vŭzstanoviavane koefitsienta na variatsiiata i koefitsienta na asimetriiata ot krivite na obezpechenost.** [Determination of the coefficients of variance and of asymmetry from probability curves.] *Khidrologiia i Meteorologiia*, Sofia, No. 4:24–32, **1956.** 8 figs., table, eqs. **DLC**—In the absence of observational data average runoff and its variance have to be computed in terms of probabilities based on analogy. In this paper the author considers the additional problem of the case where the natural runoff regime is disturbed by artificial influences, such as lakes, etc. He discusses both numerical and graphical methods of accounting for such artificial disturbances. *Subject Heading:* **1. Runoff computation.**—*G.T.*

10M–384 551.579.4 551.48.018

Dooge, James C. I. (*Civil Engineering Dept., Univ. College, Cork, Ireland*), **A general theory of the unit hydrograph.** *Journal of Geophysical Research*, Wash., D. C., 64(2):241–256, Feb. **1959.** 11 figs., 3 tables, 12 refs., eqs. **DLC**—By the single assumption that the reservoir action in a catchment can be separated from translation, the general equation of the unit hydrograph is shown to be

$$u(0,t) = \frac{V_0}{A}\int_0^{A(t)} \frac{\delta(t-\tau)}{\Pi(1+K_i D}\cdot i\cdot dA.$$

This is simplified by two further simple assumptions to give

$$u(0,t) = \frac{V_0}{T}\int_0^{t\leq\tau} P(m,n-1)\cdot w(\tau')\cdot dm$$

which can be conveniently calculated. *Subject Heading:* **1. Unit hydrographs.**—*Author's abstract.*

10M–385 551.579:551.501.5:518.3

Fischer, Johannes, **Über nomographische Verfahren in der Hydrographie, Teil I.** [Nomographic methods in hydrography, Pt. 1.] *Acta Hydrophysica*, Berlin, 1(1):31–44, **1953.** 6 figs., 12 refs., 13 eqs. **DLC**—Such values as precipitation intensity, areal intensity, volumes per unit time and total precipitation values, weighted averages for the computation of runoff ratios and similar parameters can be conveniently and more accurately computed by means of illustrated nomograms. *Subject Headings:* **1. Nomograms 2. Hydrometeorology.**—*A.A.*

10M–386 551.579:519.2

*Hahn, Artur, **Statistische Verfahren der Gewässerkunde, konkrete Zahlen- und Bilderbeispiele mit erläuterndem Text.** [Statistical methods in hydrology, numerical and graphical examples with explanatory text.] *Deutsches Gewässerkundliches Jahrbuch, Besondere Mitteilungen*, Koblenz, No. 8, **1953.** 43 p. 15 figs., refs., eqs. At head of t-p: Herausgegeben von der Bundesanstalt für Gewässerkunde in Koblenz. **DWB**—An elementary outline, explaining the conditions of time, mass, duration and frequency curves and the computation of sliding means, trends, regression equations and correlation coefficients. *Subject Headings:* **1. Statistical techniques 2. Hydrology.**—*A.A.*

10M–387 551.579:519.2

Horst, Hans, **Die physikalische Bedeutung der Koeffizienten der Fischer'schen Wasserhaushaltsgleichungen.** [Physical meaning of the coefficients in the Fischer water-economy equations.] *Deutsches Gewässerkundliches Jahrbuch, Besondere Mitteilungen*, Koblenz, No. 12:55–67, **1955.** 6 figs., 4 refs., 15 eqs. **DWB**—The formulas developed by Karl Fischer (1932) for interpreting runoff variations in terms of variable magnitudes of precipitation, evaporation and ground-water storage, are analyzed in detail and verified on various observational series. Fischer's chief merit is seen in the fact that he produced quantitative data on semi-annual variations of evaporation and ground-water storage in a catchment. *Subject Headings:* **1. Runoff variation formulas 2. Fischer water economy equations.**—*G.T.*

10M–388 551.579:519.2

Marchinkov, B., **Vŭrkhu analiticheskite korelatsii s dve i tri promenlivi i prilozhenieto im v khidrologiiata.** [Analytical correlations with two or three variables and their application to hydrology.] *Khidrologiia i Meteorologiia*, Sofia, No. 2:3–16, **1957.** 6 tables, eqs. Russian and English summaries p. 14–16. **DLC** (Slavic)—The author proposes a regression method for calculating linear correlations between two, three or more variables. This method is distinguished from the

conventional one by a simplified formula for calculating variance coefficients. Speed and simplicity of computation and versatility and adaptability are claimed as advantages of the method. *Subject Headings:* **1. Regression techniques 2. Variability coefficients 3. Hydrology.**—*G.T.*

10M–389 551.501:551.579.1:551.577.37:551.437

Pikush, N. V., **O formirovanii livnevogo stoka na malykh basseĭnakh i vozmozhnom prieme ego rascheta.** [The formation of shower runoff in small basins and possible method of calculating it.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 19:66–84, **1959.** 6 figs., 5 tables, 25 refs. **DWB**—After a general discussion of the process of runoff formation and water losses during rain showers, the author attempts to present the process of formation of shower runoff from small basins, taking into account the variation of showers and of losses and the variable runoff time, and to indicate a possible method of computing these factors. The process of runoff formation is examined for an ideal case in which losses are absent and all runoff factors are constant. In the case of uniform irrigation of the entire area, the runoff into the measuring station begins simultaneously with the beginning of irrigation and ceases some time after stoppage of irrigation. Runoff intensity will rise from zero to a maximum at the moment when the greatest area of the basin participates in the runoff. When t (duration of shower) $>\tau_1$ (time of flow), the maximum intensity of flow $b_{max}=w=tt/t$ occurs during the interval $t-\tau_1$ (where H = layer of precipitation in mm, t = duration of shower, τ_1 = least duration of flow of water particles participating in the formation of maximum intensity); if $t<\tau_1$ the maximum runoff intensity $b_{max}=H/\tau_1$ will be of least duration and the runoff hydrograph will have a single peak of a form close to a triangle. If in the irrigation of an area similar volumes of water are expended during different intensities $a_1>a_2>a_3$, constant in time, then different velocities of flow and different values $t_1\tau_1$ and $t_2\tau_2$ will occur. In the case of varying shower intensities, the maximum runoff intensity will depend on the mean intensity of the shower a_m for the period t_1. In a real basin, the movement of water during a shower occurs along a densely developed runoff network. The numerous characteristics of showers and basin runoff network, associated with the formation of runoff, are reflected by the parameters of the runoff hydrograph τ_1, τ_2 and $\alpha=f(\tau)$, and these parameters are determined on the basis of the data of runoff stations. The calculation of ordinates of the runoff hydrograph is illustrated and the results are presented in a table for different averaging periods. A diagram of the hydrograph for different periods of averaging is presented; it shows that the sides of the triangle become rounded and approach the shape of conjugated parabolas. A second method of computation of the hydrograph, which takes into account flow during rise and fall, is described and the results are presented in a table and illustrated by a diagram. Finally, the possibility of utilizing in computations of types of rain showers the propositions of Z. P. Bogomozov and Z. P. Petrov are discussed. *Subject Headings:* **1. Rainfall runoff calculations 2. Excessive rainfall.**—*I.L.D.*

10M–390 551.509.58:551.579.4

Sapozhnikov, V. I., **K uchetu neravnomernosti postupleniia vody v rechnuiu set' pri prognoze stoka.** [Accounting for irregularities in the supply of water into a river network in forecasting discharge.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 44(71):30–37, **1956.** 4 figs., 9 refs., 13 eqs. **DWB**—Under natural conditions of basins the non-uniform arrival of water into a river network is the result of non-uniform precipitation or snow melting, or non-uniform loss of water during its flow in different parts of the basin because of relief. Various attempts to take into account inequalities in runoff in forecasting floods are reviewed; these were based primarily upon the use of precipitation or snowmelt data for the entire basin and failed to consider the actual inflow of water into the river network in forecasting flow. In this paper the author presents a new method for taking into account homogeneities by analyzing the total inflow along the length of a river network and the variability of the curve of distribution of flow according to runoff time as a function of unequal arrival of water into the river network along its length. From representations of isochrones of the run of channel flow it follows that the unequal inflow within the same inter-isochronal area cannot actually influence the magnitude of the water discharge at an adjacent point. It will produce a fundamental effect only when the inflow changes along the length of the river network from one part to another. The inequality of inflow can be calculated most simply from data on two parts of a basin bounding between themselves a definite isochronal run of the channel flow. The total inflow along the entire river network is equal to $q=q_1+q_2$ where

$$q_1=Q_{II}-\sum_{k=1}^{n} Q_B \pm \sum_{i=1}^{a} \tau_i \Delta Q_i$$

$$q_2+\sum_{k=1}^{n} Q_B \pm \sum_{i=1}^{b} \tau_i \Delta Q_i$$

(Q_H = water discharge at the adjacent point, $\sum_{i=1}^{n}$, Q_B = sum of discharges at n-points located at the boundary of two parts of the basin; a and b = numbers of parts of rivers corresponding to upper and lower parts of the basin, τ_1 = runoff time in the part in which the average discharge changes for a unit of time equal to ΔQ_1). For any area between two isochrones the inflow q_1 can be calculated from

$$q_i = q_1 - \frac{\tau_1}{\tau_2 - \tau_1}(q_2 - q_1) + \frac{1}{\tau_2 - \tau_1}(q_2 - q_1)\tau_1$$

where τ_1 and τ_2 = runoff time from the centers of gravity of the corresponding lower and upper parts of the basin, τ_i = runoff time to the i^{th} interisochronal area. The parameters a and b are given by

$$a = \frac{\tau_1}{\tau_2 - \tau_1} \quad \text{and} \quad b = \frac{1}{\tau_1 - \tau_2}.$$

Finally the calculation of flow into the adjacent point is obtained by

$$Q = \sum_{\tau=1}^{\tau_{max}} 2\,[q_1 - a(q_2 - q_1) + b(q_2 - q_1)\tau]\frac{\omega_\tau}{\omega_0}$$

or

$$Q = \sum_{\tau=1}^{\tau_{max}} [k_1 - a_1(1 - k_1) + b(1 - k_1)\tau_i]q\frac{\omega_\tau}{\omega_0}$$

and

$$\frac{\omega_\tau}{\omega_0} = \frac{\pi}{\tau_{max}}\left(1 - \frac{T_i}{\tau_{max}}\right)\sin\frac{\pi}{\tau_{max}}\tau_i.$$

The application of the formulas to computing variable inflow values along the length of the Volga River and the flow of the Kama River at various points is illustrated. *Subject Headings:* **1. Runoff computation 2. Flood forecasting 3. Volga River, U.S.S.R.**—*I.L.D.*

10M–391 551.579:519.2(480)

Sirén, Allan, **Suomen vesistöalueet ja keskimääräiset valuma-arvot.** [Surface area and the average runoff of rivers in Finland.] *Finland. Hydrografiska Byran, Hydrografisen Toimiston Tiedonantoja*, Vol. 25, **1955.** 126 p. 78 figs. German summary (p. 127). **DWB**—Charts of Finland showing isopleths of rainfall (P) mm, evaporation (E) mm, and runoff coefficient (Q)e/s km² are presented. Since changes in these parameters are gradual from place to place it is possible to use them in calculation of runoff (Q) for any basin. The tables give the area (F) km² and the percentage of lake surface (L) in hundreds of places in Finland. Both major rivers (or basins), and sub areas, and corresponding runoff (Q) and river gage station numbers are listed and shown on charts. The coefficients are based on 1911–50 data. *Subject Headings:* **1. Runoff coefficient for Finland 2. Finland.**—*M.R.*

10M–392 551.579:551.501.5

Skorniakov, V. A., **Raspredelenie srednikh mnogoletnikh moduleĭ stoka v basseĭne Verkhnego Eniseia.** [The distribution of average long-period moduli of runoff in the upper Yenisey basin.] *Meteorologiia i Gidrologiia*, Leningrad, No. 8:43–44, **1957.** 2 figs., ref. **DLC, DWB**—The author constructed a map of runoff of the basin of the Upper Yenisey River in order to compute the normals of runoff flow of rivers of the basin that have not been studied. The relationship between the mean runoff moduli and the height of basins was found to be linear for nine regions of the Upper Yenisey basin. A map of mean long period moduli of runoff was constructed on this basis and is reproduced. *Subject Headings:* **1. Runoff computation 2. Runoff maps 3. Yenisey River Basin, U.S.S.R.**—*I.L.D.*

10M–393 551.579:519.2

Supino, G., **Mémoire sur l'élaboration statistique des données hydrauliques.** [Memoir on the statistical analysis of hydrologic data.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957*, [*Transactions*], Vol. 3, pub. **1958.** p. 292–299. table, 7 refs., 8 eqs. French summary p. 292. **DWB** (M(06) 1611g)—The author discusses a statistical method of determining the probabilities of rainfall, heat and the rate of discharge, similar to that presented by Gibrat and Slade. The advantages of the graphical method are discussed. He offers suggestions on the variations of the resulting curve and on the experimental frequency. *Subject Headings:* **1. Statistical analysis of hydrologic data 3. Hydrologic data analysis.**—*N.N.*

10M–394 551.579.681.177

Tonini, Dino, **Sur les corrélations entre les débits moyens de périodes successives.** [Correlation between the average flow of successive periods.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957,* [*Transactions*], Vol. 3, pub. **1958.** p. 260–267. 3 figs., 4 tables. **DWB** (M(06) I611g)—The paper summarizes the possibility of extending the use of punched cards in the research of the relationship between the average flow of successive periods. The paper concludes, by way of example, with the suggestion of a nomogram, which in the case in question, has given satisfactory results. *Subject Headings:* **1. Punched card uses in hydrology 2. Runoff correlation computation.**—*Author's abstract.*

WATER UTILIZATION, CONSERVATION AND MANAGEMENT (551.579:628.1)

10M–395 551.582(792,797) 551.579.628.1

†*Bagley, Jay M.; Criddle, Wayne D. and Higginson, R. Keith, **Water supplies and their uses in Iron, Washington and Kane counties of Utah.** *Utah. Agricultural Experiment Station (at Univ.), Special Report,* No. 13, [**1959?**]. 55 p. 18 figs., 41 tables, 28 refs. **DWB** (M79/792 B146wa)—This volume not only contains valuable information on the history of the settlement, its characteristics, soil and its usage, but also covers the relation that exists between the climate of the state and water usage, storage and stream flow systems. Precipitation and the duration of frost varies considerably from county to county. Irrigated areas have less than 13.0 in. of precipitation per year. Summaries of the annual precipitation, temperature, snow and frost are given. A chart for the annual precipitation in this tri-county area of Utah is included. *Subject Headings:* **1. Climate–water supply relationships 2. Water supply 3. Hydrometeorology 4. Utah.**—*N.N.*

10M–396 551.579:628.1(410)

Balchin, W. G. V., **Water supply and demand in Great Britain.** *Nature,* London, 184(4688):18–20, Sept. 5, **1959. DWB**—The problem of water supply and demand in Great Britain has currently received the attention of the Central Advisory Water Committee. A survey on the adequate provision of rainfall, evaporation, surface water and ground water information has been undertaken by the Meteorological, Geological and other departments. More frequent inspection of rainfall stations and more adequate records on snowfall are advocated. *Subject Headings:* **1. Water supply survey 2. Great Britain.**—*N.N.*

10M–397 551.579:628.11(792)

Bailey, Reed W. (*U. S. Dept. of Agriculture, Ogden, Utah*), **Water control through watershed management.** (In: United Nations Scientific Conference on the Conservation and Utilization of Resources, Lake Success, N. Y. 1949, **Proceedings, v. 4, Water resources,** p. 180–182, **1951.** 8 refs.) **DWB**—The author discusses the possibilities of controlling and improving the runoff distribution in areas with destroyed plant cover and disturbed soil, increasing the infiltration rate and preventing abnormal floods. Watershed management in Utah is described as an example. *Subject Headings:* **1. Water resources 2. Watershed management 3. Runoff control 4. Utah.**—*A.A.*

10M–398 551.579:628.1

Buchan, Stevenson, **Estimation of yield (underground).** *Institution of Water Engineers, London, Journal,* 7(3):205–214, May **1953.** 2 figs. Discussion p. 248–257. **DWB**—Literature on functions of an aquifer, on the balance of ground water storage and on the estimation of yield is reviewed. The problem of the limits of desirable exploitation of available underground water resources is discussed. The paper was delivered at a hydrological symposium (London, Nov. 12, 1952). *Subject Headings:* **1. Water resources 2. Water supply 3. Water conservation.**—*G.T.*

10M–399 551.579:628.1(748)

Carpenter, J. D. (*Gannett Fleming and Carpenter, Engineers, Harrisburg, Pa.*), **What are the safe yields of Pennsylvania's water sources?** *Water Works Engineering,* N. Y., 110(1):61–62, 78–79, Jan. **1957.** fig. **DLC**—Rainfall, stream flow and evaporation amounts for various parts of Pennsylvania, and their use in determining dependable water yields and amount of storage are discussed. Fifty percent of the long period average annual runoff is considered to be the maximum storage to be developed in Pennsylvania, if reservoirs are to refill each season. Rainfall-runoff relation graphs are presented for three Pennsylvania water basins. *Subject Headings:* **1. Water resources 2. Rainfall-runoff relationships 3. Pennsylvania.**—*G.T.*

10M–400 551.579:631.6

Cook, Howard L. (*U. S. Dept. of Agriculture, Wash., D. C.*), **The effects of land management upon run-off and ground-water.** (In: United Nations Scientific Conference on the Conservation and

Utilization of Resources, Lake Success, N. Y. 1949, **Proceedings, v. 4, Water resources,** p. 193–202, **1951.** 4 figs., 12 refs., 8 eqs.) **DWB**—Land management increases infiltration and evapotranspiration and reduces surface and total runoff. In a thin-soiled area the capacity of the soil controls the surface runoff; in an area of high subsurface storage capacity the surface runoff is controlled by the infiltration velocity. The conversion of a forested area to cropland usually results in a low water table and reduction in dry-weather stream flow. The author illustrates these processes with a number of examples from practical research work and discusses the general relationships and economic aspects of these problems. *Subject Headings:* **1. Hydrologic cycle 2. Land management 3. Runoff 4. Infiltration.**—*A.A.*

10M–401 551.579:628.1(04)

Edmonston, A. D. (*State Engineer, Calif.*), **Water problems in the West.** *Western Snow Conference, 20th, Sacramento, Calif., April* 1952, *Proceedings*, Appendix A, p. 1–3. **DWB**—An address illustrating the extreme variations in water supply from year to year and summarizing current water development plans. *Subject Headings:* **1. Water supply 2. California.**—*A.A.*

10M–402 551.579:628.1(44)

Frolow, Vladimir (*Paris, France*), **Water control through watershed management.** (In: United Nations Scientific Conference on the Conservation and Utilization of Resources, Lake Success, N. Y. 1949, **Proceedings, v. 4, Water resources,** p. 186–192, **1951.** 3 refs. **DWB**—A general report on experience in France with control of underground water for the supply of water to towns, water spreading, water and erosion control, soil conservation and restoration, especially in mountain regions, and destruction caused by roads. The establishment of an international advisory body for soil protection and restoration is proposed. *Subject Headings:* **1. Water conservation 2. Watershed management 3. Soil conservation 4. Erosion control 5. France.**—*A.A.*

10M–403 551.579:628.1(773)

†*Illinois. State Water Survey Div., **Potential water resources of Southern Illinois.** Its *Report of Investigation*, No. 31, **1957.** 97 p. 48 figs., 41 tables, 34 refs. **DLC**—Items of meteorological interest include data about rainfall and runoff, droughts, estimates of evapotranspiration, pan evaporation. A very detailed account of possible water reservoir sites, with runoff data, is given. *Subject Headings:* **1. Water resources 2. Hydrologic cycle 3. Illinois.**—*A.A.*

10M–404 551.579:628.1

Jackson, S. K. (*Div. Hydrologist, U. S. Geological Survey, Denver, Colo.*), **Water budget of open reservoirs.** *Texas A. and M. College, College Station, Proceedings of the 3rd Annual Conference on Water for Texas, Sept. 1957*, (issued **1958?**). p. 46 49. fig., 7 refs. **DWB** (M79 C748pro), **DLC** (TD201.T37)—The ever-increasing demand for water has emphasized the need for detailed accounting of available supplies. Data required for the determination of the elements of the water budget include: inflow, precipitation, change in storage, evaporation, transpiration, and outflow. *Subject Headings:* **1. Water supply studies 2. Reservoir hydrology.**—*N.N.*

10M–405 551.579:628.1

Jarrett, Reginald H., **Some aspects of the urban geography of Freetown, Sierra Leone.** *Geographical Review*, N. Y., 46(3):334–354, July **1956.** 17 figs. (incl. photos), foot-refs. **DWB, DLC**—The section dealing with the physical geography of Freetown contains a brief note on rainfall in relation to water supply and an evapotranspiration diagram for this city. *Subject Headings:* **1. Rainfall-water supply relationships 2. Evapotranspiration 3. Freetown, Sierra Leone.**—*I.L.D.*

10M–406 551.579:628.13

Kennard, J. et al., **Estimation of yield (overground).** *Institution of Water Engineers, London, Journal*, 7(3):196–204, May **1953.** 3 figs., 6 refs. Discussion p. 238–248. **DWB**—In a paper delivered at a hydrological symposium (London, Nov. 12, 1952), the yield of water reservoirs is defined as "a joint function of the average runoff, the capacity of the reservoir and the degree of risk of failure which can be tolerated." Several methods of estimating safe yield from rainfall or runoff records are reviewed and compared in graphical form. Many details and basic problems bearing on the subject are elaborated on in the summarized statements of the numerous authorities participating in the discussion. *Subject Headings:* **1. Reservoirs 2. Water supply.**—*G.T.*

10M–407 551.579:628.1(431/5)

Koehne, Werner (*Bielefeld*), **Das erste nach gewässerkundlichen Gesichtspunkten bemessene Wasserwerk.** [The first water works built from a hydrological point of view.] *Deutsches Gewässerkundliches Jahrbuch, Besondere Mitteilungen*, Koblenz, No. 4:72–77, **1952.** **DWB**—Careful and

comprehensive investigations about precipitation, runoff, percolation and ground water were made before a waterworks near Magdeburg was built. The water yield should not exceed the percolation amount in order to prevent serious damage to plants and trees in surrounding fields and forests. *Subject Headings:* **1. Water supply 2. Hydrologic cycle 3. Germany.**—*A.A.*

10M–408 551.579:551.588.6(494)

Kuntschen, F. and Bircher, J. (*Bern, Switzerland*), **The effect of stream management on water yields.** (In: United Nations Scientific Conference on the Conservation and Utilization of Resources, Lake Success, N. Y. 1949, **Proceedings, v. 4, Water Resources,** p. 205–215, **1951.** 4 figs.) **DWB**—Brief description of the geographical, meteorological, topographical and other conditions for the natural runoff in Switzerland, of the change in the regime of watercourses and lakes by artificial means and of systematic experiments to determine the effects of deforestation and reforestation. The total annual discharge in Switzerland is 53,000 mill. m^3 from 41,324 km^2, of which 33,500 mill. m^3, or 63%, are controlled by the Rhine. Sixty-three percent of the total discharge runs off during the summer months, from April to Sept. *Subject Headings:* **1. Water resources 2. Forest influences 3. Runoff 4. Switzerland.**—*A.A.*

10M–409 551.579:711.4

†Mikulski, Zdzisław, **Zagadnienia wodne w planowaniu miast i osiedli.** [Hydrological problems in planning cities and dwelling centers.] *Przegląd Geofizyczny,* Warsaw, 2(1/2):41–51, **1957.** 39 refs. **DWB, DLC**—The problem of the increasing importance of solving hydrological problems associated with the ever increasing size of city and rural settlement construction is discussed. A review of recent literature by Polish and foreign authors dealing with the problem is presented. *Subject Headings:* **1. Hydrologic studies 2. Town planning.**—*A.M.P.*

10M–410 551.579:551.577:628.1

Möhler, Benno, **Speichermöglichkeiten in Südwürttemberg und Hohenzollern.** [Water storage possibilities in South Württemberg and Hohenzollern.] *Wasserwirtschaft,* 44(8):197–202, May **1954.** 3 figs. **DLC**—The mean annual precipitation over South Württemberg and Hohenzollern is 920 mm (22 m^3 per person), 24% of which runs off during the winter half year and 18% in the summer. The distribution of precipitation, groundwater resources and water deficiency over the region is discussed, showing the possibility of great improvement of the water economy of the area by the building of 41 storage reservoirs. *Subject Headings:* **1. Hydrologic cycle 2. Precipitation runoff 3. Water retention 4. Southwest Germany.**—*A.A.*

10M–411 551.579:62(282.263)

Morrice, H. A. (*Irrigation Adviser to the Republic of Sudan*), **The use of electronic computing machines to plan the Nile Valley as a whole.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept.* 1957, [*Transactions*], 3; pub. **1958.** p. 95–105. 3 figs. **DWB** (M(06) I511g)—The paper starts with a brief hydrological description of the salient features of the Nile Basin. The problem to be solved is then stated. How should the Nile and its tributaries be controlled in order to provide the largest possible amount of irrigation water for the Sudan and Egypt? The proposed method of solution is by trial and error, taking advantage of the excellent hydrological records available and the ability of modern electronic computers to handle large amounts of numerical data. The problem is reduced to its essentials and the advantages of the solution by trial and error are explained. Not only is it rapid, flexible and accurate, but the engineer responsible can see all the time exactly what is happening. Although it has been found by experience that this method works well, a number of difficulties have been encountered. None has proved to be insuperable and many lessons have been learned. The most important and significant among them are described in the last part of this paper. *Subject Headings:* **1. Engineering hydrology 2. Irrigation calculations 3. Electronic computer application to hydraulics 4. Nile River.**—*Author's abstract.*

10M–412 551.579:62

Mosonyi, Emil, **Natural storage effect in the mountainous drainage areas of the Carpathian basin.** *I.U.G.G. Association of Scientific Hydrology, Oslo,* 1948, [*Transactions*], Vol. 1, pub. **1951.** p. 169–176. 3 figs., table, 26 eqs. **DWB**—An elaborate mathematical treatment from the engineering point of view, dealing with the depletion curve of discharges for the driest years on record and the necessary capacity of storage dams, in order to equalize seasonal runoff. Since hydrometric observations are not available everywhere, the author adopts a constant ratio between maximum and average annual precipitation for a given climatic region. *Subject Headings:* **1. Depletion curves 2. Engineering hydrology.**—*A.A.*

10M–413 551.579:628.13

Oesterhaus, M. and Walser, E., **Von der Notwendigkeit einer zielbewussten Ordnung aller menschlichen Einwirkungen auf das Wasser.** [The necessity of coordinating all human influences on water.] *Switzerland. Anstalt für das forstliche Versuchswesen, Mitteilungen*, 35(1):85–89, 1959. 3 figs., French, Italian and English summaries p. 88–89.—Progress in technology and subsequent steadily growing claims and increasingly more exacting demands for water create complex problems which call for a close international cooperation of all organizations interested in water economy. The importance of research is emphasized, especially of studies of runoff and related processes, as BURGER has performed in the model example of Sperbel- and Rappengraben. *Subject Headings:* **1. Water conservation 2. Runoff 3. International cooperation in hydrology. I. Burger, H.**—*Authors' abstract.*

10M–414 551.579:627.51

Schloemer, Robert William, **Hydrometeorology in design.** Washington, D. C., U. S. Weather Bureau [1955?]. 8 p. 7 figs., 16 refs. **DWB**—Floods are initially a meteorological phenomenon. Therefore, although the hydrometeorologist does not and cannot pick the final value for design, he must provide the design engineer with all pertinent information available. This paper briefly outlines the meteorological problems of special interest to flood control design and describes present methods of hydrometeorological analysis used to provide the design engineer with pertinent meteorological information. *Subject Headings:* **1. Flood control design 2. Hydrometeorological data analysis.**—*Author's abstract.*

10M–415 551.579:626.81(812.3)

Schroeder, Klaus, **Der Rio Grande del Norte unter dem Einfluss der modernen Wasserwirtschaft.** [The effects of modern water management on the Rio Grande del Norte.] *Die Erde*, Berlin, 89(3/4):321–334, **1958.** 4 figs., 2 tables, 18 refs. English summary p. 321. **DWB, DLC**—Water utilization in the Rio Grande Basin dates back to prehistoric times, but has not very much changed the natural runoff for centuries. Since 1900 an extensive program for the utilization of water resources with all methods of modern engineering has been accomplished. Some important effects on the runoff of the Rio Grande and its tributaries are discussed in detail and shown in figures. Today the Rio Grande consists of 3 nearly disconnected river systems: the Upper Rio Grande down to El Paso, the Pecos River down to Grandfalls, N. M., and the Rio Conchos-Lower Rio Grande system. Because of the large number of diversions in the Lower Rio Grande Valley for irrigation on both sides of the river, and after the construction of Falcón Dam only very little water runs into the Gulf of Mexico. *Subject Headings:* **1. Agricultural hydrology 2. Runoff 3. Irrigation 4. Rio Grande Basin, U. S.**—*Author's abstract.*

10M–416 551.579(6) 551.579:061.3

Staples, R. R., **The water cycle as affected by land use.** (In: African Regional Scientific Conference, Johannesburg, Oct. 17–28, 1949, [**Proceedings**], Vol. 2, pub. **1950.** p. 66–90. Summary in English and French p. 66–67.) **DWB**—Precipitation, runoff, evaporation, transpiration, ground water and research in water economy of south, central and east Africa are discussed in connection with land usage. *Subject Headings:* **1. Hydrologic cycle 2. Land utilization 3. Water supply 4. Africa.**—*M.R.*

10M–417 551.579:551.437(6):061.3

Wight, C. L., **The management of water catchments.** *African Soils*, London, 4(3):20–51, **1959.** 2 photos, 10 refs. Text in French and English.—This report prepared for the fifth meeting of the Southern African Regional Committee for the Conservation and Utilisation of the Soil, held in Windhoek, South-West Africa, in 1957, refers to the need for the application of hydrology in the management and conservation of water catchments. The importance of the holistic approach, treating catchments as ecosystems, is emphasized. Under the sub-heading "Foundations of Catchment Management," the hydrological influence of biocoenoses and structural works in water catchments are briefly described. Practical catchment management measures are listed with indications of the objects of management they serve. The paucity of hydrological data is mentioned and the need for more bio-hydrological research is stressed. A procedure for achieving efficient water catchment management within a region is outlined. *Subject Headings:* **1. Hydrology 2. Watershed management 3. Southern African Regional Committee for the Conservation and Utilization of the Soil, Windhoek, 1957.**—*A.V.*

HYDROLOGIC SERVICES (551.579:06)

10M–418 551.579:06

Bertle, Frederick A. (*Oakland, California*), **Hydrometeorological log of the Upper Columbia Snow Laboratory, 1945–46.** *Western Snow Conference, 1948, Proceedings*, pub. Feb. **1949.** p. 55–76.

6 figs., 3 tables. **DWB**—The Upper Columbia Snow Laboratory, which was established in the autumn of 1945 in the Marias Pass sector of Montana (on the southwest edge of Glacier National Park), is described, the site and meteorological equipment are shown in photographs, and the observational program conducted during the first year (1945–46) and the data compiled for the first year (radiation, air temperature, wind direction and speed, streamflow, precipitation, snow depth and water equivalent of snow) are presented in tables and charts. The hydrologic cycle (water balance) is calculated from these data. *Subject Headings:* **1. Hydrometeorological observations 2. Snow laboratories 3. Montana.**—*M.R.*

10M–419 551.579:061.3

Blizniak, E. V., **O vliianii deiatel'nosti cheloveka na stok.** [Influence of man's activity upon runoff.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geogr.*, No. 3:139–141, March **1957. DWB**—In 1956 the Department of Hydrology of the geographical faculty of Moscow University held a conference on the effect of human activity on runoff. The problems discussed were: effect of reservoirs on water runoff; water balance of reservoirs and its components; evaporation from the water surface of reservoirs, water basins and from banks adjoining reservoirs; variation of maximum water discharge in regard to the regulating volume of reservoirs; variation of solid runoff in relation to the establishment of reservoirs; variation of the chemical composition of water in relation to the establishment of reservoirs in river valleys; effect of irrigation and drainage on runoff; and effect of afforestation on runoff. Data are presented showing that economic activity reduced runoff. For example, in the Volga basin runoff decreased by 33 mm between 1922–24 and 1935–37. The smaller the natural regulation of runoff, etc., the greater is the water regulating role of forests. The various papers presented are listed together with the names of their authors, and are summarized briefly. *Subject Headings:* **1. Runoff research 2. Hydrologic studies 3. Hydrologic conferences.**—*I.L.D.*

10M–420 551.579:06(47)

Bogomazova, Z. P., **O rezul'tatakh rabot stokovykh statsiĭ Gidrometsluzhby i perspektivakh ikh razvitiia.** [Results of work by runoff stations of the Hydrometeorological Service and perspectives of their development.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 8, issued **1959.** p. 38–44. fig. **DWB** (M79 V985tr)—Presently 18 experimental runoff stations (watersheds) are operated in the U.S.S.R., the first started in 1920. Their surface ranges from 0.02 sq km to several hundred sq km. Research is mainly concerned with small watersheds complete water balance, with water and sediment flow in channels and on small runoff plots and with meteorological elements of water balance. 280 research reports have been published, most important of which cover snow survey methods, soil moisture measurement, evaporation and runoff from small watersheds. Research programs of some of the stations are briefly outlined. *Subject Headings:* **1. Hydrometeorological services 2. Hydrologic stations 3. U.S.S.R.**—*J. Nemec.*

10M–421 551.579:06(47)

Chernoivanenko, I. M., **Uchastie Rostovskogo upravleniia gidrometsluzhby v gidrometeorologicheskom obsluzhivanii velikikh stalinskikh postroek.** [Participation of the Rostov Administration of the Hydrometeorological Service in serving Stalin's great new construction projects.] *Meteorologiia i Gidrologiia*, No. 6:16–17, **1952. DLC**—The Hydrometeorological Office in Rostov on the Don since Jan. 1950 rendered service to the new Volga-Don hydraulic construction projects. During the period 1950–1951 the most important forms of service were: weather and hydrological forecasting (short and long ranges) and warnings of dangerous phenomena, information about water regime, runoff flood waters, etc., on the Volga, Don and their tributaries. In order to provide the most effective service, a special group under the supervision of scientists of the Central Institute of Forecasting was organized. *Subject Headings:* **1. Hydrometeorological service 2. U.S.S.R.**—*N.T.Z.*

10M–422 551.579:06(498)

Dumitrescu, Sorin, **Cinci ani de activitate a Direcţiei Generale Hidrometeorologice.** [Five years of activity of the Central Hydrometeorological Office.] *Meteorologia şi Hidrologia*, Bucharest, 1(1):5–10, Oct. **1956. DWB**—Since its establishment in July 1951 the Romanian Hydrometeorological Office has been engaged in reorganizing and relocating stations of the hydrologic and meteorological networks and improving their instrumentation. The Synoptic Section now issues forecasts for natural synoptic periods (4–10 days) in addition to 24-hour and 3-day forecasts. Two aerological observatories are in operation at Bucharest and Cluj and there are 4 radiosonde stations and several pilot balloon stations. Research activities are conducted in the fields of microclimatology, agrometeorology, instrumentation, hydrology, etc. Publications include the journal *Meteorologia şi Hidrologia*, a climatic atlas, climatological and hydrologic data, etc. Liberal assistance has been received from the Soviet Union. The Hydrometeorological Office is a member of WMO. *Subject Headings:* **1. Romanian Hydrometeorological Office 2. Romania.**—*G.T.*

10M–423 551.579:06(43

Jablonska, Teresa; Mikulski, Zdzisław and Stephen, Wanda, **Monographies hydrologiqu publiées par le Service Hydrologique de Pologne.** [Monographs in hydrology published by t Polish Hydrological Service.] *International Union of Geodesy and Geophysics. Association Scientific Hydrology, Toronto, Sept. 1957,* [*Transactions*], Vol. 3, pub. **1958.** p. 347–358. 7 fig table. **DWB** (M(06) 1611g)—Monographs on the achievements of the Polish Hydrological Servi after World War II are summarized. They cover the intensive development of river basins, the geography and hydrological and climatic factors. *Subject Headings:* **1. Hydrology monograph 2. Polish Hydrological Service.**—*N.N.*

10M–424 551.579:06(47

Mishkarev, A. I., **Ob uchete effektivnosti gidrometeorologicheskogo obsluzhivaniia narodnog khoziaĭstva.** [Evaluation of the effectiveness of the hydrometeorological service for the nation economy.] *Meteorologiia i Gidrologiia,* No. 5:29–30, **1952.** ref. **DLC**—Consideration of the syste of accounting for the results of the Service. The author reviewed proposals presented for this purpos by the Hydrometeorological Service at Kuibyshev and used by the Weather Bureau of Kazan The principal forms for evaluation are: a book of comments and criticisms where references to fore casts which have been listed (advices and warnings can be placed here also); special service to con sumers; and finally, special reports sent to the Meteorological Service yearly and containing qualita tive estimates of service and critical remarks. *Subject Headings:* **1. Hydrometeorological service 2. U.S.S.R.**—*N.T.Z.*

10M–425 551.579:06(43)(494)(497.1

Petrović, R., **Izveštaj o radu u Nemačkoj i Švajcarskoj, 1954/55.** [Account of activities i Germany and Switzerland, 1954/55.] *Yugoslavia. Hidrometeorološka Služba, Vesnik,* 4(3/4):88–9 July/Dec. 1955. **DWB**—The author visited the hydrological services in Germany and Switzerlan and gives a detailed account of their regular measurements, research work, forecasting, publicatio and other activities, adding his recommendations concerning improvements in the hydrologica service of Yugoslavia. *Subject Headings:* **1. Hydrologic services 2. Germany 3. Switzerlan 4. Yugoslavia.**—*G.T.*

10M–426 551.579:06(82

République Argentine: Rapport sur l'activité. Síntesis de las actividades hidrometeorológica desarrolladas por el Servicio Meteorológico Nacional (División Hidrometeorología) durante lo últimos tres años. [Summary of hydrometeorological activities in the National Meteorologica Service (Hydrometeorological Division), in the last three years.] *I.U.G.G. Association of Scientifi Hydrology, Brussels, 1951,* [*Transactions*], Vol. 1, **1952.** p. 61–62. **DWB**—A short general report Argentina now has about 3500 pluviometric and 170 hydrometric stations. *Subject Headings* **1. Hydrometeorological services 2. Argentina.**—*A.A.*

10M–427 551.579:06(498

Shakhnovich, A. V., **Gidrometeorologischeskaia sluzhba v Rumynskoĭ Narodnoĭ Respublike** [The Hydrometeorological Service of the Romanian Peoples' Republic.] *Meteorologiia i Gidrologiia* Leningrad, No. 4:49–52, April **1958. DWB, DLC**—Regular meteorological observations began in Romania in 1831 and a central meteorological institute which directed a meteorological network and provided the function of a weather bureau was established in 1884. It is only since 1951 that a well organized weather service has begun to develop when a Central Directorate of Hydrometeorological Service was established. The hydrological and meteorological networks have been combined and the representativeness of the stations has been improved. The hydrometeorological service is now a unit of the State Committee on Water Economy. There is a Central Meteorological Institute and a Central Hydrological Institute. The hydrometeorological network includes 103 synoptic stations, 55 supporting climatological stations, 100 third-order stations, and 800 regularly reporting rain stations, and a number of mountain stations. The hydrological network rain stations, and a number of mountain stations. The hydrological network consists of 27 stations and 450 measuring posts. There are only three stations where radiosondes are used. There are 60 agrometeorological stations, 38 evaporation measuring stations and 300 phenological observation points. Some of the more important publications include: **Cloudiness regime in Romania** (1933) and **Climate of Dobuja** (1939), by C. Disescu; **Mean flow of Romania** (1953) (by a group of authors); **Climate of the Romanian People's Republic** (1953) by M. Stoenescu; **Mean geopotential at 500 mb over Europe** (1957) by D. Lazarescu and I. Panait; **Mean turbidity of Romanian rivers** (1957) by C. Diaconu; etc. Yearbooks, monthly decadal bulletins and atlases have been published. Also various groundwater studies and special climatic studies are mentioned. *Subject Headings:* **1. Hydrometeorological services 2. Meteorological networks 3. Hydrologic networks 4. Romania.**—*I.L.D.*

10M–428 551.579:06

White, Gilbert F., **Emerging needs in development of the world's rivers.** *World Meteorological Organization, WMO Bulletin,* 7(3):108–112, July **1958.** photo, map. **DWB**—The need for international cooperation in development of river basin potentials is emphasized in view of the fact that over 100 of the major streams are international and, hence, subject to political control. Cooperation is also needed in improving basic services in hydrology, such as instrumentation, publication of data, and study of the hydrologic cycle. A large chart shows river basins of >1,000,000 sq km, and those 500,000 to 1,000,000 sq km. *Subject Headings:* **1. River basin development 2. Hydrologic services 3. International cooperation in hydrology.**—*M.R.*

10M–429 551.579:061.3 551.501.8:061.3

Conference on Water Resources, Oct. 1951, Urbana, Ill., **Proceedings . . . on the occasion of the dedication of the Water Resources Building.** *Illinois. State Water Survey Division, Bulletin,* No. 41, **1952.** 335 p. 160 figs., eqs., bibliog. **DWB**—The 40 papers in this volume are grouped into three categories. (I) Hydrology, (II) Treatment and (III) Radar-Weather. (For a listing of pertinent papers see *Met. Abs.* 3(10):1103–1104, Oct. **1952**). The hydrology section contains two papers of interest to hydrometeorologists: 1) Hazen, Richard, **Analysis and use of surface water data,** p. 87–98 and 2) Jens, S. W., **Engineering meteorology,** p. 99–122. The Radar weather section consists of 16 papers. Following each paper are more or less elaborate discussions. Several panel discussions are also appended. A list of the 481 registrants and their affiliations completes this conference report. *Subject Headings:* **1. Hydrologic conferences 2. Water resources 3. Radar meteorology conferences.**—*M.R.*

10M–430 551.579:061.3(439.1)

Marchinkov, B., **Iubileĭniiat kongres na Ungarskata Khidrolozhka sluzhba prez 1955 godina v Gr. Buda-Peshta po sluchaĭ 70-godishninata ot osnovavaneto i.** [Jubilee Congress of the Hungarian Hydrological Service in 1955 in Budapest, on the occasion of the 70th anniversary of its foundation.] *Khidrologiia i Meteorologiia,* Sofia, 1:47–56, **1957. DLC**—Extensive summaries are given of the seven papers presented at this Hungarian Hydrological Conference. The papers dealt with the history, present activities and future plans of the Hungarian Hydrological Service, runoff and flood conditions; measurement and forecasting in Hungary, ice conditions, suspended matter, evaporation, flow velocity, etc. *Subject Headings:* **1. Hungarian Hydrological Service 2. Hydrologic conferences.**—*G.T.*

10M–431 551.579:061.3(497.2)

Nauchna sesiia v Instituta po Khidrologiia i Meteorologiia. [Scientific session at the Meteorological and Hydrological Institute.] *Khidrologiia i Meteorologiia,* Sofia, No. 45:56–58, **1956. DLC**—Six papers delivered at a meeting of the Bulgarian Hydrometeorological Service (June 14–15, 1958) are summarized. The papers dealt with synoptic conditions of severe frost in Bulgaria; upper air cold centers over Europe and their effect on Bulgaria; soil moisture regime in chernozem; runoff regime of the Vucha River; a recording river gage and an instrument for horizontal visibility measurement. *Subject Headings:* **1. Hydrometeorological conferences 2. Synoptic conditions for frost 3. Bulgaria.**—*G.T.*

10M–432 551.579:061.3:551.482

Zinov'eva, E. M., **Soveshchanie po voprosam izucheniia stoka malykh rek.** [Conference on problems connected with the investigation of the discharge of small rivers.] *Meteorologiia i Gidrologiia,* Leningrad, No. 5:68, **1958. DWB, DLC**—At an inter-regional scientific meeting, organized by the section on energy and water economy of the Kazan' branch of the Academy of Sciences of the U.S.S.R. on November 27–28, 1957, 14 papers, dealing chiefly with the discharge of small rivers, were delivered. The resolutions stressed the lack of discharge maps and the need for developing a method for constructing maps, characterizing different discharge phases of small rivers, increasing the use of material of expeditions and of systematic observations on water levels, on bridges traversed by roads and railroads, and establishing a mobile system of hydrometric stations in order to study discharge of small rivers. The need for studying the relationship of surface to underground water was discussed. *Subject Headings:* **1. River discharges 2. Hydrologic conferences 3. U.S.S.R.**—*I.L.D.*

HYDROLOGIC SURVEYING (551.579:778.35)

10M–433 778.35:551.579

Kudritskiĭ, D. M., **Primenenie aerometodov pri gidrologicheskikh issledovaniiakh.** [The use of aerial methods in hydrological investigations.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 8, issued **1959.** p. 197–206. 24 refs. **DWB** (M79 V985tr)—

After a short survey of past and present methods of aerial photographic surveying, their applicati to hydrological surveying is discussed. These methods have been used to analyze formation meanders in rivers, in mapping new watersheds, for hydrogeological survey, for analysis of sho formation in reservoirs, for sea and lake bottom mapping, in limited extent for river bottom mappin for gaging of surface velocities of water streams and for analysis of wave formation and wave motio Aerophotography and aerostereophotogrammetry are compared for several purposes. *Subje Headings:* **1. Hydrologic studies 2. Aerial surveying.**—*J. Němec.*

10M–434 778.35:551.5

Pugin, A. A., **Ispol'zovanie materialov aeros"emok pri ekspeditsionnykh issledovaniiakh GG** [Use of aerial survey data during expeditionary investigations by the Main Hydrological Institute *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 8, issued **1959.** p. 21 221. 4 figs. **DWB** (M79 V985tr)—In order to acquire more precise information on hydrologic phenomena in watersheds smaller than 100 sq. km. in Northern Kazakhstan, the State Hydrologic Institute proceeded to an aerial photographic survey aimed at an analysis of the distribution snow cover in different phases of melting, establishing more precise watershed lines, evaluatin volumes of lakes, volumes of temporary melt water collecting in front of railroad culverts and t extent of flooded regions in river valleys in spring. In all these tasks, the aerial photograph was t cheapest and fastest method. In three years, aerial photographs were made of 400 lakes, and 2 lake and 35 river watersheds with a total surface of 50,000 sq. km. *Subject Headings:* **1. Hydrolog studies 2. Aerial surveying.**—*J. Němec.*

10M–435 778.35:551.579:48

Romanova, E. A., **Primenenie aerofotos"emki dlia gidrologicheskogo issledovaniia bolot.** [Us of aerial photographic surveys in hydrological investigations of swamps.] *Vsesoiuznyĭ Gidrolog cheskiĭ S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 8, issued **1959.** p. 221–228. 2 figs., 6 refs **DWB** (M79 V985tr)—Since 1932, the State Hydrological Institute of the U.S.S.R. has been usin aerial photographs to solve different problems in the hydrology of swamps. Mosaics of a scale c 1:25,000 are used exclusively. As main interpretation characteristics, the grain, belt zonality an color gradation of the picture are used which show the vegetation cover, the microtopography an consequently, the type of swamp plots. Aerial pictures also permit mapping of the drainage patter of the swamp and swamp topography. Several hydrological problems, such as design of drainag systems, can be solved by analyzing these charts. *Subject Headings:* **1. Swamp hydrology 2. Aeria surveying.**—*J. Němec.*

HYDROLOGIC NETWORKS (551.579:551.501.9)

10M–436 551.501.9:551.579(47–12

Glubokov, V. N., **Geografo-gidrologicheskoe raĭonirovanie izuchaemoĭ territorii i puti razvitiia gidrologicheskoĭ seti na primere Zabaĭkal'ia.** [Geographic-hydrological classification of a regio under study and trends in the development of a hydrological network as exemplified by the Trans baikal region.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 8 issued **1959.** p. 18–23. fig. **DWB** (M79 V985tr)—Criteria for establishing geographical-hydro logical zones can be found in changes of heat-availability, humidity and their interrelation. This i applied to the Transbaikal region. A climatic and topographic description of the region is given Seven zones are established. In each, a few main hydrological stations are to be located and severa secondary temporary (1–2 year duration) stations. Thus 200–210 main and 30–50 secondary stations would be permanently in operation. The necessity for concentration of observations in on service is stressed. *Subject Headings:* **1. Hydrologic networks 2. Transbaikal region, U.S.S.R.**— *J. Němec.*

10M–437 551.579:551.501.9(49)

Kudelin, B. I., **Gidrogeologicheskie trebovaniia k razmeshcheniiu gidrometeorologicheskoĭ seti na rekakh, punktov nabliudenii za elementami vodnogo blansa vodosborov i stokvykh stantsiĭ.** [Hydrological requirements for the distribution of a hydrometeorological network on rivers, at points of observation on the elements of the water balance of catchments and at gage stations.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 8, issued **1959.** p. 140–147. 3 figs., table, 10 eqs. **DWB** (M79 V985tr)—When establishing a long-term water balance of any watershed, the losses or gains to or from artesian water should always be included. To make this possible, an approximate hydrological gaging net has to be established, taking into consideration the hydrological characteristics of the watershed. The Dnieper-Don artesian water basin is presented in three charts as an example, and discussed. *Subject Headings:* **1. Hydro-meteorological networks 2. Hydrologic stations 3. U.S.S.R.**—*J. Němec.*

10M–438 551.501.9:551.579(47)

Proskuriakov, A. K.; Borsuk, O. N.; Koplan-Diks, S. I. and Znamenskaia, E. M., **Sostoianie i erspektivy rasvitiia gidrometricheskikh rabot na seti gidrologicheskikh postov i stantsiĭ.** [State nd perspectives of the development of hydrometric work at the network of hydrological stations nd posts.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 8, ssued **1959.** p. 6–18. fig., 3 tables. **DWB** (M79 V985tr)—The present hydrographic net of USSR was built in the past 80 years. In 1946, a revision of the net was planned, providing for 0,746 gaging stations (10,147 on rivers); there were 9217 discharge gaging stations. The present number of stations is 5541. The density of stations is very uneven. An exhaustive table of the haracteristics of the net shows that the maximum density is in Armenia (1265 sq km per station), nd the minimum in the Ob'-Yenisey basin in Yakutia (23,800 sq. km. per station). The average or the USSR is 3,900 sq. km. per station. Of the existing stations 30.2% have records for less han 10 years; 33.6%, 11–25 years; 28.7%, 26–50 years and 7.5% longer than 50 years. 14.1% of he stations gage sediment transport, 21.2% conduct chemical water analyses, and 72.2% gage lischarges. Difficulties in gaging small watersheds are increased by numerous small hydroelectric ower stations and reservoirs. *Subject Headings:* **1. Hydrologic networks 2. USSR.**—*J. Němec.*

10M–439 551.501.9:551.579:551.437

Reinhart, K. G., **Calibration of five small forested watersheds.** *American Geophysical Union, Transactions*, 39(5):933–936, Oct. **1958.** 2 figs., 3 tables, 2 refs. **DWB, DLC**—On the Fernow Experimental Forest in West Virginia, five forested watersheds 38 to 96 acres in area, have been gaged by the U. S. Forest Service since 1951. The watersheds are close together, for the most part contiguous, and are similar in topography, soil, forest cover, and stream-flow characteristics. The methods and problems of calibration should interest other investigators in this field because seldom has a group of watersheds been calibrated for forest watershed research to determine the effects of a range of cutting treatments. After calibration, four watersheds will be cut over, using four different cutting practices. One watershed will be used as a control. Effects of treatment on stream flow will then be measured. Methods of WILM and of KOVNER and EVANS were used to determine length of calibration period based on an analysis of annual, monthly, peak, and low flows. Problems of treatment assignment are discussed. *Subject Headings:* **1. Hydrologic networks 2. Forest watershed research.**—*Author's abstract.*

10M–440 551.501.9:551.579

Trestman, A. G., **Voprosy ratsional'nogo razmeshcheniia gidrologicheskoĭ seti.** [Rational arrangement of a hydrological network.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 8, issued **1959.** p. 23–30. 2 figs., 2 tables. **DWB** (M79 V985tr)—The irrational distribution of gaging stations is criticized. Using the Vakhash River in the Amu-Darya River basin as an example, it is shown that if the correlation and location of a station are adequate, only one station, instead of three, is necessary. The Sangikarr and Sorbog, Surkhob, and Obikingor Rivers are also mentioned as examples. Three different curves, expressing the relation between elevation of water shed and average annual unit discharge, are plotted, depending on the surface of the watershed covered by ice. (Footnote of editors disagrees with this last figure). *Subject Headings:* **1. Hydrologic networks 2. Amu-Darya Basins, USSR.**—*J. Němec.*

HYDROLOGIC DATA (551.579:551.506)

10M–441 551.579:551.506(497.1)

*Jevdević, Vujica (Belgrade), **Odnosi prosecnih vrednosti za oticaj i padavine kraćih perioda prema prosecima dužeg perioda.** [Relations of mean hydrologic values of short observation periods to those of longer periods.] *Yugoslavia. Hidrometeorološka Sluzba, Rasprave i Studije*, No. 4:3–12, **1953.** 2 figs., 10 tables. French and English summaries p. 11–12. **DWB**—Yearly averages of discharge and precipitation amount are tabulated for 3 river gaging and 5 precipitation stations in Yugoslavia for periods varying between 61 and 110 years. Average values are also presented for these stations for the following periods: (1) longest record available, (2) 1890–1950 (longest common period for all 8 stations), (3) 1923–1940 (period between two wars), (4) same as (3), but disregarding the extremely rainy year 1937, (5) 1923–1950, (6) 1945–1950 (period after 2nd World War), (7) 1923–1940 and 1945–1950 (with omission of war-time years). The validity of the average values for each of these periods is determined. The purpose of the study is to serve as a guide to the evaluation of discharge and rainfall records of limited length. Records in Yugoslavia are extremely heterogeneous owing to unsteady development of networks and wartime limitations. *Subject Headings:* **1. Hydrologic data 2. River discharges 3. Rainfall amounts 4. Yugoslavia.**—*G.T.*

10M–442 551.579:551.506(48

*Lyshede, J., **Beretning fra vandbalance udvalget.** [Report from the Committee of the Hydr logic Cycle.] *Akademiet for de Tekniske Videnskaber, Copenhagen, Beretning*, No. 17, **1952.** 64 p 6 figs., 6 graphs, 11 tables, eqs. English summary. **DLC**—The purpose of this investigation w to find possible means of a conformable distribution of precipitation based on seepage, runo evaporation and transpiration. Based on precipitation, runoff and pumping station data, comput tions involving a water balance equation gave mean values from Nymölle and Lyre, two of Cope hagen's ground-water areas. The annual evapotranspiration of both was 365 mm. in spite of rath different extension and topography. The evaporation value corresponds remarkably well wit that from Southern Sweden. *Subject Headings:* **1. Hydrologic data 2. Copenhagen, Denman 3. Sweden.**—*W.N.*

10M–443 551.579:551.577(43

***Mesačnâ Zpráva Hydrologická,** Prague. [Monthly hydrological bulletin.] [1928?–] Issue seen include v. 109, pub, 1935; issues for 1934 and 1936 (no vol. numbers indicated); and Vol. 155/12 No. 25/12 for Dec. 1946, pub. 1946. Title-page in Russian, English, French and Czech. This *Vodopis Československé Republiky, Series 1*, Prague. Title of series and sub-series varies slightly **DLC**—The Dec. 1946 issue of the **Bulletin** contains data of daily and monthly amounts of precipitation mean and extreme monthly air temperatures, thickness of snow cover, its water equivalent, an depth of frozen soil. Table 2 shows the daily variations of water levels in cm and runoff in m^3/s at 71 stations. Maps of precipitation and snow cover distribution in the territory of the Republi in December 1946 are included. *Subject Headings:* **1. Precipitation data 2. Hydrologic dat 3. Snow cover data 4. Czechoslovakia. I. Czechoslovakia. Stâtní Ústav Hydrologický a Hydro technický.**—*A.M.P.*

10M–444 551.579:551.506(72

*Tamayo, Jorge L., **Datos para la hidrología de la República Mexicana.** [Hydrologic data fo Mexico.] *Instituto Panamericano de Geografía e Historia, Publicación*, No. 84, **1946.** 2 v. v. 1 Text; v. 2, Maps, statistics and graphs (fold.). **DWB, DLC**—The first comprehensive summary of basic hydrologic data for Mexico. The number of stations in 1945 was: 1384 for precipitation 228 for evaporation, 233 hydrometric stations. The hydrographic characteristics of rivers, hydro metric stations, and equipment used are described and a list of catchment areas is given on p. 101–111 Maximum discharge vs. catchment area is studied in detail on p. 345–361. Data on river discharge into the Atlantic and Pacific Ocean, the Bay of California and interior runoff are tabulated on p. 368 374. The appendix (vol. 2) contains a valuable map of annual precipitation 1:4.6 mill for 1921–194 (deficiencies: no grid and no rivers drawn, so that orientation is difficult); detailed maps of catchmen areas and hydrometric stations 1:2 mill; data for drainage areas, average maximum and minimum discharge and runoff, as well as data for river load. *Subject Headings:* **1. Hydrologic data 2. Pre cipitation charts 3. Catchment basins 4. Mexico.**—*A.A.*

10M–445 551.579:551.506(485

Sweden. Meteorologiska och Hydrologiska Institut, **De svenska vattendragens arealförhål lånden, Pt. 11, Mörrumsåm, Helgeån, Rönnean m. fl. (Flodamrådena mellan Emån och Lagan).** [Regional conditions of Swedish water courses, Pt. 11, Mörrumsån, Helgeån, Rönneån a.o. (The river territories between Eman and Lagan).] *Its Meddelanden, Ser. C*, No. 1, **1947.** 18 p. 2 maps, 2 tables. Also: **Pt. 12, Lagan, Nissan, Atran, Viskan, m. fl.** *Ibid*, No. 2, **1948.** Also: **Pt. 13, Vänern —Götaälv.** *Ibid*, No. 3, **1950.** 32 p. map, tables. Also: **Pt. 14, Bohusländ och Gotlands vatten drag sam vattendrag söder em Dalälven, som avrinna till Norge.** [The water courses of Bohuslan and Gotland and the water courses south of the Dal River, flowing into Norway), *Ibid.*, No. 4, **1951.**— Tables of precipitation and runoff by drainage areas are given together with an alphabetical list of stations contained in the tables, and a brief text explaining the tables. A large chart of the region shows the numerous lakes and water courses. *Subject Headings:* **1. Hydrologic data 2. Precipitation 3. Runoff 4. Sweden.**—*M.R.*

10M–446 551.579:551.506(775)

*Wisconsin-Michigan Power Company, **Annual weather bulletin and Menominee River data summary, 1954.** 20 p. numerous tables. Mimeo. **DWB** (M:551.46 W811an)—Crop, precipitation, temperature, evapotranspiration, snow cover, wind, daylight and other hydrologic data for Appleton, Wis. and the Menominee River Basin for 1954 are summarized and discussed month by month. Curves show seasonal trends in various elements. *Subject Headings:* **1. Hydrologic data 2. Annual hydrometeorological data reports 3. Menominee River Basin, Wis.**—*M.R.*

HYDROLOGIC FORECASTING (551.579:551.509.3)

10M–447 551.509.329:551.579.4:551.482(584.8)

Abal'ian, T. S., **Prognoz stoka rek Chuĭskogo basseĭna.** [Forecast of the discharge of rivers in the Chu River Basin.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 67:3–41, **1958.** 12 figs., 13 tables, 9 refs. **DWB**—In this investigation of the conditions of formation of the flow of the rivers of Northern Kirgizia in order to be able to forecast the mean discharge during the vegetative period, the author examined the group of rivers of the Chu basin, which irrigate that part of Kirgizia that is most developed economically. The contents of this comprehensive study comprise the following: physical geography of the region investigated, including geology and characteristics of the rivers; the precipitation and temperature regime; conditions of runoff formation at the source of the rivers; the determination of moisture supply in the basin of rivers of the northern slope of the Kirgiz range; and the forecasting of flow during the vegetative period. Extensive data on air temperature, precipitation, moisture supply, river discharge, etc., are presented in tables, and the relationship between discharge during the vegetative period and (1) total precipitation for given periods, and (2) winter moisture supplies in the basin, are given in graphs. *Subject Headings:* **1. River discharge forecasting 2. Chu River Basin, U.S.S.R.**—*I.L.D.*

10M–448 551.509.329:551.579.4:551.482(584.8)

Abal'ian, T. S., **Stok r. Chu vyshe Orto-Tokoĭskogo vodokhranilishcha.** [Discharge of the Chu River above the Orto-Tokoĭskiĭ reservoir.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 67:32–57, **1958.** 7 figs., 4 tables, 5 refs., 3 eqs. **DWB**—The Chu River differs substantially in its upper flow from the majority of other mountain rivers of Central Asia and even from the rivers of its own basin. This is most evident in the regularity of its flow, which varies slightly more than two fold during the entire year, while the flow of other rivers of this basin vary 6–10 times. This is explained by the fact that the flow of the Chu River is partly the result of underground waters. The physical geographic characteristics of the Chu River basin, their role in the formation of the Chu River flow, the precipitation conditions in the Chu River basin and the relationship of flow and precipitation during winter and summer are discussed. This is followed by an account of the surface flow of the river, flood formation, recharge by underground water, the determination of moisture supply in the Chu River basin and the forecasting of the Chu River flow during the vegetative period. Data on the total annual precipitation during the cold season in mm, on module coefficients and on the water content of snow of the Kara-Kudzhur River basin at the end of February for the period 1936–1954, are presented in tables. *Subject Headings:* **1. River discharge forecasting 2. Chu River, U.S.S.R.**—*I.L.D.*

10M–449 551.509.329.2:551.579.4:628.13

Advamovich, E. A., **Prognoz dekadnogo bokovogo pritoka vody v vodokhranilishche Gor'kovskoĭ GES v period vesennego polovodiia.** [Forecasting the decadal lateral water supply to the Gorki Hydroelectric Station during spring high water.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 65:63–70, **1958.** 4 figs., 4 tables, 3 refs., 6 eqs. **DLC**—The forecast of the decadal magnitude of lateral inflow into the reservoir of the Gorki Hydroelectric Station is based upon the relationship

$$\sum_{t}^{t+\Delta t} Q_{ST} = W_t + \sum_{t}^{t+\Delta t} q_{pr}$$

where $\sum_{t}^{t+\Delta t} Q_{ST}$ = volume of flow through the gage before the forecast period Δt; W_t = volume of water in the river network bounded by the isochrone $\tau = \Delta t$; $\sum_{t}^{t+\Delta t} q_{pr}$ = amount of water arriving in the river network during the time Δt. The water supply in the river network was determined from data on water discharge and the morphometric data of a series of gages on the tributaries falling into the reservoir. The total volume of water in a river system divided into N section is given by

$$W = \sum_{i=1}^{N} \tilde{\omega} l_i$$

where l = length of sections and ω = area of active cross-section of the channel as a function of water level at measuring stations. The inflow of water into the river network before the forecast period is characterized by the rate of snow melting; the daily values of melt water for the river basin (h) was computed by the formula

$$h = k_p \tilde{l} \omega_p + k_l \tilde{l} \omega_l$$

where k_p and k_l = coefficients characterizing the melting layer (in mm) for 1°C positive mean dai air temperature for field and forest respectively; t = mean daily air temperature in the basin, w_p ar w_l = area of simultaneous snow melting in field and forest respectively. The forecast of mean decad inflow into the Gor'ki Hydroelectric Station was calculated by the relationship

$$\bar{Q}_{t+10} = f(W_t \bar{h})$$

where $\bar{Q}_{t+10}$ = expected mean decadal lateral inflow, W_t = actual water supplies in the river netwo on the day the forecast is issued, t, and h = rate of snow melting in the basin. The lateral inflo (Q_{bp}) is given by the formula $Q_{bp} = Q_{N,\,t+\tau} - Q_{v,\,t}$, where Q_N and Q_v = discharge in lower and upp sections. The computation of the lateral inflow is illustrated. *Subject Headings:* **1. Reservo forecasting 2. Water supply to reservoirs.**—*I.L.D.*

10M–450 551.509.59:551.579.4:551.482(477.9

Aĭzenberg, M. M., **Osbennosti gidrografii i maksimal'nyĭ stok rek i vremennykh vodotok Stepnogo Kryma.** [Hydrographic characteristics and maximum discharge of temporary streams i the Crimean steppe.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institu Trudy*, No. 19:125–135, **1959.** 4 refs., charts. **DWB**—The geomorphology, rock composition, soil ground water regime, and the river network (including its spring flood regime) of the Crimean step are described. The maximum discharge was computed as the product of the area of cross sectio at the slope of the highest catchment basin by the corresponding mean velocity of the current $V = C\sqrt{h_m i}$ and $Q = \omega v$, where v = velocity, i = slope of the highest catchment basin, ω = areas of activ cross section up to highest historical horizon. The appendix contains tables giving the fundamenta hydrographic characteristics of rivers and temporary streams of the Crimean steppe, maximu water discharges of rivers and temporary streams of the Crimean steppe, determined according to thi marks of horizons of highest water and maximum discharges of water of rivers and temporary stream of the Crimean steppe, determined according to the formula of O. V. Ogievskiĭ and according t the marks of the highest water horizon. The formula of O. V. Ogievskiĭ is

$$Q_{2\%} = 0.65 F^{0.58} BCn\beta\tau\alpha_3 K_n K_1 \lambda m^3/\text{sec}$$

It is shown that the maximum water discharge of the Crimean steppe is of two types, viz: snow-rai discharge formed as a result of snow melt and simultaneous rainfall and rain water discharge. Annua maxima formed only from melt water are not observed here as a rule. *Subject Headings:* **1. Rive discharge forecasting 2. Crimea, U.S.S.R.**—*I.L.D.*

10M–451 551.579.4:551.482:551.509.32

*Banerji, S. K. (*Calcutta*), **Problems of river forecasting in India.** *National Institute of Science of India, Delhi, Proceedings*, 16(6):395–[420], Nov./Dec. **1950.** 14 figs., tables. 14 refs. Ab stracted from reprint. **DWB**—River forecasting is explained on the basis of the analysis of storms area-depth curves, rainfall, hydrographs, etc. Average and extreme monthly and annual temperatur are given for 65 catchment areas and shown on a separate map. *Subject Headings:* **1. River forecast ing 2. Hydrographs 3. Temperature data 4. Catchment basins 5. India.**—*A.A.*

10M–452 551.509.58:551.579.4:551.482

Berbenets, A. M., **Kratkosrochnyĭ prognoz ezhednevnykh urovneĭ vody po summe raskhodov verkhnikh stvorov.** [Short-range forecast of daily water levels from the sum of the discharges at gaging stations in the upper reaches.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeoro logicheskiĭ Institut, Trudy*, No. 19:109–113, **1959.** 4 figs., table, 5 eqs. **DWB**—In order to make fore casts 7–10 days in advance it is necessary to investigate a longer stretch of the river so that individual sections will then have tributaries. By using the principle of corresponding levels, but using instead of levels corresponding discharges for tributary sections the equation $H_L^{n+\tau} = f(\Sigma Q_u^n)$ is set up, where $H_L^{n+\tau}$ = forecast level of water of the lower station, a period of time τ in advance, ΣQ_u^n = sum of water discharges of the upper gaging station. The construction of theoretical curves of water discharges of the Dnieper River at Novo-Bykhov and at Loev are described and curves showing the dependence of daily curves of water levels of the Dnieper River at Loev on the total discharges of upper gaging stations for flood periods 4 days in advance, for recession periods 7 days in advance, etc., are presented. A table giving the verification of daily forecasts of levels of the Dnieper River in 1957 is included. *Subject Headings:* **1. River level forecasting 2. Dnieper, U.S.S.R.**—*I.L.D.*

10M–453 551.579 551.509.5:551.579.4

Bruce, J. P., **Hydrometeorology and its applications in Ontario.** *Royal Society of Canada, Transactions*, Ser. 3, 51(4):63–70, June **1957.** 20 refs. **DLC**—In recent years, an increasing aware ness has developed of the contributions meteorology can make to the understanding of hydrological

roblems. The resulting branch of applied meteorology, known as hydrometeorology, is concerned mainly with two general problems. These are (1) providing estimates of future storm and flood magnitudes and their probabilities of occurrence as design criteria for river structures, and (2) developing techniques for and operating river forecasting and flood warning systems. Techniques used in solving these problems are outlined, and examples given of application of the methods to Ontario rivers. *Subject Headings:* **1. Hydrometeorology 2. River forecasting 3. Flush warning networks 4. Ontario.**—*Author's abstract.*

10M–454 551.509.58:551.482:551.579.4(282.247)

Bydin, F. I., **Razvitie nekotorykh voprosov v oblasti letnego [svobodnogo ot l'da] rezhima vodoemov.** [Development of certain problems in the field of the summer [ice-free] regime of water reservoirs.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 7, issued **1959.** p. 75–82. 4 figs., table, 8 eqs. **DWB** (M79 V985tr)—Analysis and synthesis of hydrographs of spring floods on Dnieper River leads the author to a formula for forecasting daily flow, the hydrograph of spring flow from melting snow and the computation of maximum and minimum discharges from correlated precipitation records. This should also permit a better computation of water balance of reservoirs. *Subject Headings:* **1. River forecasting 2. Water balance of reservoirs 3. Hydrographs.**—*J. Němec.*

10M–455 551.509.58:551.579.4:628.1

Fuhrmann, Hugo, **Langfrist-Prognosen des Wasserdargebots.** [Long-range forecasting of water supply.] *Wasserwirtschaft,* Stuttgart, 49(8):218–219, Aug. **1959.** 2 refs. **DLC**—The author presents a detailed summary of Erik Blomquist's study **Vattenhushaltning vid langtidsreglering** [Water management during long period regulation], *Svenska Vatlenkraftforeningens Publikationer,* No. 467, **1958,** p. 39–100). The paper deals with the best economic use of seasonal storage which must be managed in such a way as to undertake a certain energy guarantee and to provide the maximum energy production. The combination of methods of continuous periodicity of runoff and of frequency analysis is used to provide such a solution. As regards the energy guarantee, it is necessary to determine the beginning of spring runoff, the magnitude of the expected inflow into storage and the economically advantageous storage capacity. Spring runoff is determined by correlating the water flow of a stream in Northern Sweden with one in southern Sweden. The expected inflow is determined by means of a method which enables the construction of a runoff forecast from the measured or estimated snow amounts as well as from the assumption that snow melt ends in July–Aug. at the latest. The storage amount is based upon the guaranteed minimum runoff as is expressed by the "degree of regulation." The latter is the relationship of storage content and annual amount of water. The regulation curve is developed from the summer runoff curves. The average and duration of observation period are decisive for the regulation curve. The application of the procedure to the production of hydroelectric power is discussed. *Subject Heading:* **1. Long-range water supply forecasting.**—*I.L.D.*

10M–456 551.509.331:551.579.4:551.482(282.247)

Kaganer, M. S., **Opyt primeneniia sinoptiko-klimatologicheskogo metoda L. A. Vitel'sa dlia prognozirovaniia elementov vodnosti p. Dnestra s bol'shoĭ zablagovremennost'iu.** [Experiment on the use of the synoptic-climatological method of L. A. Vitel's in long range forecasting the elements of the water volume of the Dniester River.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy,* No. 19:93 108, **1959.** 4 figs., 8 tables, 11 refs. **DWB**—The history of hydrometric observations in the basin of the Dniester River, the water supply of the Dniester basin which, on the basis of its orographic and hydrometeorologic characteristics consists of three parts, namely the Carpathian, Volyno-Podolsk and the lower and southern part, the flood frequencies, runoff characteristics, etc. are described by the author. The synoptic-climatic long range forecasting method of L. A. Vitel's, involving the comparison of group characteristics of circulation processes of two groups of years with different anomalies, both positive and negative, was used in determining long range forecast characteristics for the Dniester River. In working with the water regime it is necessary to determine years of extremely low runoff or extremely high runoff. For groups of these runoffs, group characteristics of the pressure circulation regime for the preceding period are computed. Calculations have shown that for forecasting mean annual and quarter year discharges the best results are obtained by introducing pressure circulation characteristics for the three preceding years; for the remaining characteristics the pressure circulation characteristics of the two preceding years are adequate. The results obtained allow the formation of the following forecasts for the Dniester River: mean annual discharges 14 months in advance; mean quarterly discharges 3 to 12 months in advance; mean monthly discharges 1 month in advance; volume of spring floods and maximum discharges from melt waters 2 to 3 months in advance; the forecasts have in most cases a high reliability and effectiveness. Data on the extreme values of

modules of coefficients for discharges of the Dniester River for 1900–1917, 1929–1941, 1945–195 etc., the relationship of forecast data, reliability of method, natural occurrence, effectiveness forecast of mean monthly discharge, etc. are presented in tables. *Subject Headings:* **1. River forecas ing 2. Dniester River, U.S.S.R.**—*I.L.D.*

10M–457 551.509.58:551.579.4:551.482(57)(28

†Kharshan, Sh. A., **Dolgosrochnye prognozy stoka polovod'ia gornykh rek Sibiri.** [Long ran forecasts of spring high water discharge from mountainous rivers in Siberia.] Moscow, Gidr meteoizdat, **1958.** 76 p. 20 figs., 9 tables, 34 refs., eqs. **DWB** (M09.585 K45do)—A study ar analysis of main factors determining the extent and the form of spring high-water runoffs of Siberi mountain rivers and streams is presented. The methods of determining water reserves in the sno cover, the height of the seasonal snow line, areas of simultaneous snow melting, as well as the prepar tion of long-range forecasts of high water runoff for the whole period and for individual periods snow melting (at various altitudes) are taken up in detail. The booklet is intended for hydrologist both forecasters as well as those that are investigating and calculating the runoff of mountai rivers. *Subject Headings:* **1. Snow melt runoff 2. River discharge forecasting 3. Mountain river 4. U.S.S.R.**—*A.M.P.*

10M–458 551.509.58:551.579.

Lambor, Julian (*Prof., Politechnique, Varsovie*), **Prévision de la hauteur des crues.** [Forecas ing flood heights.] (In: I.U.G.G. Association of Scientific Hydrology, **Symposia Darcy, Dijon Sept. 1956 [Proceedings]**, Vol. 3, pub. **[1957?]** p. 28–36. 6 figs., eqs.) **DWB** (M79 I61sym Also in: *Acta Geophysica Polonica*, Warsaw, 4(3):125–138, **1956.** 6 figs., 3 refs., 13 eqs. Polis summary p. 137–138. **DWB, DLC**—An empirical evaluation of flood water, its height and charac teristics as well as the hydrological problems associated with flood waters, is given. The repor illustrates a method of forecasting flood height by the study of the meteorological factors such as th areal precipitation and physical conditions, such as topography, catchment, vegetation and soi The mathematical coefficients that interplay for a particular regional forecast are derived. Th forecast of the flooding of Carpathian rivers has been studied by this method and is reported. *Subjec Heading:* **1. Flood forecasting.**—*N.N.*

10M–459 551.509.329:551.579.

Nezhikhovskiĭ, R. A., **Prognozy stoka zimnikh pavodkov.** [Forecasting winter flood discharge. *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 65:153–156, **1958.** 2 figs., 5 refs. **DLC**— This attempt to forecast winter floods was undertaken for the Pliuss River, which is responsible fo the inequality in the inflow into the water reservoir of the Narva Hydroelectric Station. The runof layer for the floods was analyzed by constructing complex graphs of the hydrometeorological element for 16 winters for the gage of the Slantsa River. By eliminating the underground replenishment and analyzing the hydrographs, the floods for each melting period were distinguished so that 4 winter floods produced by snow melting and 26 floods of mixed rain and snow origin were obtained The procedure for forecasting winter floods resembles that for forecasting spring floods. The runof for a flood is determined primarily by the water yield of the surface of the basin. For "melt" winter floods $(S_1+X)-S_2$ and for "mixed floods" S_1+X, where S_1 and S_2 = water supply in the snow cover at the start and end of melting (in mm), respectively, S = sum total of precipitation for the melting period (solid and fluid). The relationship between runoff layer and yields of water at the surface (determined by field survey) was determined separately for the "mixed" and "melt" floods. The length of winter floods is considerable and if the forecast is to be issued on the basis of the final melting it can be made 5–6 days before the maximum and 8–14 days before the end of the flood. By use of the relationship between runoff layer during a flood and the maximum discharge it is possible to forecast the entire flood hydrograph. This forecast procedure for "mixed" and "melt" floods is applicable to the conditions prevailing in northwestern European USSR. *Subject Headings:* **1. Runoff forecasting 2. Winter runoff 3. Winter flood forecasting 4. U.S.S.R.**—*I.L.D.*

10M–460 551.579.2:551.509.39

Parshall, Ralph L., **Forecast of runoff based on the water content of the watershed snow cover corrected by a factor involving fall flow of the stream.** *Western Snow Conference, Proceedings 1948*, pub. Feb. **1949.** p. 157–161. 2 figs., 3 tables. Discussion by Jacobson, C. B. p. 162–165. fig., tables. **DWB**—*Subject Headings:* **1. Runoff forecasting 2. Stream flow 3. Water content of snow.**

10M–461 551.509.33:551.579.4:551.482(282.247) 551.582(581)

*Parshin, V. N., **Dolgosrochnyĭ prognoz vodnosti rek Tedzhena i Murgaba.** [Long range forecast of the water volume in the Tedzhen and Murgab Rivers.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 62:3–53, **1957.** 18 figs., 26 tables, 5 refs. **DLC**—An attempt is made to

forecast the flow of Tedzhen and Murgab Rivers of Turkmeniia on the basis of hydrometeorological observations in Central Asia since the catchment areas of these rivers are located outside the borders of the USSR, namely Iran and Afghanistan, and practically no data are available. The contents of his comprehensive study include the following: the hydrography of these rivers which originate in Northern Afghanistan, the characteristics of the soils, and vegetation of this region; the general characteristics of the atmospheric circulation and of the climate of northern Afghanistan; the availability of hydrometeorological data (atmospheric temperature, precipitation and snow cover) for Afghanistan; flow data for the Tedzhen and Murgab Rivers; air temperature, precipitation and snow cover variations in the basins of these rivers; analysis of the conditions involved in the river flow during individual seasons and years; forecasting of flow during the vegetation period and maximum discharges and forecasting of monthly flow. Extensive hydrometeorological data are presented in tables and graphs. *Subject Headings:* **1. Long range river forecasting 2. River discharges 3. Climate of Afghanistan 4. Hydrometeorological data 5. Tedzhen River 6. Murgab River 6. Asiatic USSR**:—*I.L.D.*

10M-462 551.509.329:551.579.4:551.482(282.252)

Podvishenskaia, N. Ia., **Metod prognoza urovneĭ v basseĭne r. Amura.** [Method of forecasting levels in the basin of the Amur River.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 69:45–99, **1958.** 24 figs., 15 tables (2 tables in appendix), 10 refs. **DLC**—This study on forecasts of water levels in the Amur basin includes the following: (1) forecasts of level for the period of open channel for gages of the Kumara, Blagoveshchensk, etc. from one to twenty days in advance; (2) forecasts of mean, maximum and minimum monthly levels for the same points; and (3) forecast of pre-spring minimum levels for Khabarovsk and other points. A brief physiographic and climatic description of the basin, a review of existing works on forecasting methods and an account of the river regime are presented. The forecast of daily levels on the Amur involves the determination of the mean discharge (level) of water at a gage, for any period, from the computed water volume in the channel system. The relevant equations for making daily forecasts of level for the Amur and Zeya Rivers and for the other types of forecasts are presented. The results of forecasts are shown in graphs and tables. *Subject Headings:* **1. River level forecasting 2. Amur River 3. Asiatic USSR.**—*I.L.D.*

10M-463 551.509.329:551.579.4

Podvishenskaia, N. Ia. and Fedina, M. K., **Prognoz prodolzhitel'nosti zatopleniia rechnykh poĭm talymi i dozhdevymi vodami.** [Forecasting the duration of flooding of river valleys with melt and rain water.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 68:112–115, **1958.** 2 figs., ref. **DLC**—The peculiarity of forecasts of the duration of river valley flooding in the Far East Territory is the fact that flood duration is influenced by precipitation in the basin after peak flood formation. Precipitation in the first period of recession retards the recession and often causes a new rise so that the time of liberation of the flooded valleys cannot be predicted from the flood recession. In the case of small rivers with basins less than 1000 km² the time of flooding is 2–4 days and is almost independent of the height of the peak flood. The mean duration of flooding can be forecast with a mean error of ±1 day. In the case of larger rivers the relationship between duration of flooding (K) and flood peak (H_{max}) is not very close if precipitation is not considered. The duration of flooding, where rain floods are important, can be forecast only a short time in advance, the same with which the maximum rain flooding can be forecast. For swampy rivers the determination of spring flood duration must take into account degree of saturation of swamps from the time of fall before freezing. *Subject Headings:* **1. Flood forecasting 2. Flood duration.**—*I.L.D.*

10M-464 551.509.329:551.579.4:551.482

Sapozhnikov, V. I., **Prognoz dekadnogo pritoka vody k stvoru Gor'kovskoĭ GES.** [Forecasting the decadal water inflow at the river gage of the Gorki Hydroelectric Station.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 65:23–62, **1958.** 9 figs., 10 tables, 13 refs., 63 eqs. **DLC**—The calculation and forecasting of flow in the regulated sections of rivers below water reservoirs involves the solution of two fundamental problems, namely: computation of the transformation of the release of water through the water-collecting equipment of the hydroelectric station and computation of the intermediate inflow from the factors determining it. The decadal inflow to the gage of the Gorki Hydroelectric station during high water can be represented in the general form

$$\bar{Q}_{n+10} = \bar{Q}_1' + \bar{Q}_1'' + \bar{Q}_2' + \bar{Q}_3'' + \bar{Q}_4''.$$

The decadal forecast is based upon a computation procedure allowing calculation of the variation in the inflow of water to the lower gage of a section for a given variation in the water released through the upper gage of the river section and the inflow of water into the river network of the intermediate area. In this procedure the characteristics of the flow of water in a given part of the network of the

river basin must also be taken into account. The flow of water along a section to the gage is computed by the formula

$$Q_t = r_{mr}Q_{t-\tau_0-\tau_{mr+1}} + r_{mr-1}Q_{t-\tau_0-\tau_{mr+2}} + \cdots + r_1Q_{t-\tau_0} = \sum_{i=t-\tau_0-\tau_{mr+1}}^{t-\tau_0} r_\tau Q_i$$

where Q_t = discharge of water at time t; τ_0 = time at which the water discharge of the upper gage has not caused an increase in the flow in the lower gage; τ_{mr} = duration of channel flow, i.e. time in which the water discharge of a given day participates in the formation of discharge in the lower gage. When the ordinates of the curve $r = f(\tau)$ are established, the transformation on the given section of the Volga between Iaroslavl and Chkalovsk is

$$Q_p = 0.01Q_{t-9} + 0.03Q_{t-8} + 0.06Q_{t-7} + 0.10Q_{t-6} + 0.17Q_{t-5} + 0.27Q_{t-4} + 0.26Q_{t-3} + 0.10Q_{t-2}.$$

Equations for computing total inflow of water into the river network and the intermediate inflow are also presented. The method of forecasting the decadal inflow of water into the Gorki Hydroelectric station is presented in detail, the relevant equations being developed and actual computations carried out and the result given in tables. *Subject Headings:* **1. River forecasting 2. Water supply 3. U.S.S.R.**—*I.L.D.*

10M–465 551.509.58:551.579:627.1

Sapozhnikov, V. I. and Grechko, E. S., **Prognoz pritoka v vodokhranillishche Volzhkoĭ GES im. V. I. Lenina po sootvestvennyn raskhodam i promezhutochnomu pritoku.** [Forecasting the intake of the reservoir of the V. I. Lenin Volga Hydroelectric Power Station by the corresponding discharges and intermediate gains.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:40–44, Jan. 1959. 2 figs., 3 refs., 18 eqs. **DWB, DLC**—The authors examine the use of data on the water discharge of upper measuring posts and the tendency of variation of intermediate flow to make short range forecasts of water inflow into the reservoir of the V. I. Lenin Volga Hydroelectric Power Station. The simplest method of forecasting flow for inflow section from actual data on water discharges in the river network is examined. The water discharge in the lower measuring point $Q_{L,n}$ (n = date on which forecast is issued, τ = time to date for which forecast is made) consists of 2 components: $Q_{L,n+\tau} = Q_n' + Q_n'' + \tau$. Q' is determined by water discharges of the upper measuring points in the same isochrone of channel flow and Q'' is the intermediate inflow during the period of the forecast range. The formulas for Q_n' and $Q_{n+\tau}'$ are derived and the formula for forecasting discharge is

$Q_{L,n+\tau} = a\sum_{i=1}^{N} Q_{i,n} + bQ_n''$. The procedures for making forecasts, and equations for an 8-day forecast are developed. *Subject Headings:* **1. Water inflow forecasts 2. Reservoir intake forecasts.**—*I.L.D.*

10M–466 551.509.58:551.579.4(282.244.3)

Serra, K., **L'étude météorologique des possibilités de crues, application à la Durance.** [Meteorological study of the possibility of floods as applied to the Durance River.] (In: I.U.G.G. Association of Scientific Hydrology, **Symposia Darcy, Dijon, Sept. 1956 [Proceedings]**, Vol. 3, pub. **1957.** p. 291–299. 3 figs. French summary p. 291. **DWB** (M79 161sym)—By the method of extrapolation of the observed data on the runoff of the Durance River and its affluent, the Rhone in the French Alps it would always be difficult to forecast flood possibility in the area. This report gives two other methods of predicting the flood, and describes briefly the precipitation conditions, the wind effects over the area, quoting specific examples of the meteorological factors that were involved in the disastrous floods of June 9, 1953 and June 8, 1955. *Subject Headings:* **1. Flood forecasting 2. Durance River, France 3. Rhone River, France.**—*N.N.*

10M–467 551.509.58:551.579:551.482

Sugawara, Masami and Maruyama, Fumiyuki, **A method of prevision of the river discharge by means of a rainfall model.** (In: I.U.G.G. Association of Scientific Hydrology, **Symposia Darcy, Dijon, Sept. 1956 [Proceedings]**, Vol. 3, pub. **1957.** p. 71–76. 12 figs., 3 eqs.) **DWB** (M79 161sym)—A trial and error method has been used to formulate a somewhat complicated formula which contains non-linear operation to estimate the runoff from rainfall. This method was used satisfactorily in the study of the estimated runoff, flood forecasting and total precipitation of the Kinu and Kitakami Rivers. Eleven different types of mechanisms used for individual phenomena are presented. *Subject Headings:* **1. River discharge forecasting 2. Rainfall models 3. Kinu, Japan 4. Kitakami, Japan.**—*N.N.*

10M–468 551.509.5:551.579.4:551.437

Szesztay, K. (*Res. Inst. for Water Resources, Budapest*), **Some methodical problems of flood forecasting in drainage basins of great extension.** (In: I.U.G.G. Association of Scientific Hydrology,

ymposia Darcy, Dijon, Sept. 1956 [Proceedings], Vol. 3, pub. 1957(?). p. 198–206. 7 figs., table, refs., 10 eqs.) **DWB** (M79 161sym)—The Hungarian Research Institute for Water Resources, Budapest, has examined the graphical presentation of flood forecasting as observed on the Hungarian Danube (1955) at the time of the crest at Engelhartszell. Eight key stations and eleven auxiliary tations on the Danube were studied. This graphical method reveals that there is a close interrelation mong the parameters, that the weight of one variable is outstanding and that any further variables re approximately of the same weight. These are expressed mathematically. *Subject Headings:* **1. Flood forecasting 2. Hungary.**—*N.N.*

10M–469 551.509.58:551.579.4:551.482:628.1

U. S. Weather Bureau, **Summary report on the role of river forecasting and hydrometeorological nalysis in water resources.** Prepared for the Select Committee on National Water Resources, J. S. Senate. Wash., D. C., Oct. **1959.** 57 p. 15 figs., 2 tables. **DWB** (M79.4 U587su)—The summary report is presented collectively to illustrate the significance of river and flood forecasting nd its interrelation with warning services and national defense. The techniques, facilities required, s well as the advantages of adequate daily, seasonal and yearly forecasts are discussed. The report ncludes specific studies of meteorological trends and cycles on the Nile and Colorado Rivers. These studies reveal that wet years in these areas tend to occur in groups, as do dry years. Geologic evidence shows that there are major shifts in climate—from tropical to Arctic and back again; but little is known of these climatic trends since weather forecasting a few months ahead is yet impossible. Much is to be done in this field in the future. *Subject Headings:* **1. River forecasting 2. Hydrometeorological analysis 3. Nile River 4. Colorado River.**—*N.N.*

10M–470 551.509.329:551.579.4:551.482:519.241.1

Van Horn, O. B. (*Corps of Engineers, Omaha, Neb.*), **Evolution in derivation of seasonal streamflow forecast procedures.** *Western Snow Conference, April 1958, Proceedings*, pub. Oct. **1958.** 26:82–90. 6 figs. **DWB** (M(06) W527p)—A team of Corps of Engineers in the Missouri Reservoir Control Center and one from the Planning and Reports Branch of the Missouri River Division have recently developed techniques for deriving the seasonal streamflow forecasts by using a multiple regression method. *Subject Headings:* **1. Stream flow forecasting 2. Multiple regression techniques 3. Missouri River.**—*N.N.*

10M–471 551.509.58:551.579.1

Work, R. A. and Beaumont, R. T. (*both, Soil Conservation Service, Portland, Oregon*), **Basic data characteristics in relation to runoff forecast accuracy.** *Western Snow Conference, April 1958, Proceedings*, 26:45–53, Oct. **1958.** 2 figs., 5 tables, 8 refs. **DWB** (M(06) W527p)—This report analyzes the importance of basing the forecasts of river flows upon data secured as close as possible to the water sources. Snow surveys are usually most efficient and also yield the most accurate forecasts, particularly in places where the data are obtained from the heart of the water-producing areas. A more precise method of sampling the greatest factor in stream flow production in the mountainous western areas of the U. S. is given. *Subject Headings:* **1. River flow forecasts 2. Runoff forecasts 3. Forecast accuracy.**—*N.N.*

10M–472 551.509.329:551.579.4(522.5)

Yamaga, N., **A study on flood forecasting over the river Shirakawa in Kumamoto Prefecture, Pt. 1.** *Journal of Meteorological Research*, Tokyo, 10(7):620–624, July **1958.** 2 figs., 7 tables, 3 refs., eqs. In Japanese. **DLC**—The results of a study of heavy rainfalls over the Shirakawa river area, made by Kumamoto district meteorological observatory on the basis of data of 67 heavy rainfalls from 1926–1958 are reported. The genetic classification of heavy rainfall, the relation between local rainfall at Aso mountain and average rainfall in its vicinity, the relation between runoff and water level at two different locations in the Shirakawa River and flood propagation are discussed with empirically derived equations and tabulated data. *Subject Headings:* **1. Flood forecasting 2. Heavy rain classification 3. Shirakawa, Kumamoto Prefecture, Japan.**—*J. H. Woo.*

MOUNTAIN AND FOREST HYDROLOGY (551.579:551.588.6)

10M–473 551.584.41 551.579:551.588.2

Delfs, J., **Der Einfluss des Waldes und des Kahlschlages auf den Abflussvorgang, den Wasserhaushalt und den Bodenabtrag: Die Niederschlagszurückhaltung in den Beständen (Interception).** [Effect of forests and clearings on runoff, water balance and erosion: Interception of precipitation in stands.] *Aus dem Walde*, Hannover, No. 3:76–107, **1958.** 14 figs., 9 tables, refs. English summary p. 216–217.—Interception and stem flow in different age classes of pure spruce stands were measured from 1952 to 1956 in the Upper Harz Mountains. Precipitation reaching the ground in

the tree stands was measured by 5 m long and 20 cm wide pans and compared with precipitation c bare ground. Thus the interception was calculated. The interception by a normal crown cov amounted to an annual mean of 36% in saw timber-size stands, 28% in pole-size stands, 21% sapling stands, and 11% in plantations shortly after crown closure. During the summer months t interception was higher than in winter. Interception varied from month-to-month, e.g. from 15 to 63% in saw timber-size stands. Months with a high precipitation had the lowest interceptic percent, months with a low precipitation had the highest interception percent. During individu rainfalls the interception percent decreased with the amount and length of precipitation. T highest absolute interception occurred during heavy rainfalls although the interception percenta was low. The storage of water by interception is greatest at the onset of precipitation with th first wetting of the crowns. Measurements in openings of the stands indicated that only drastical reduced crown density resulted in a noticeable decrease of interception. Stem flow was caught b troughs that ringed the trees and led the water to a closed container. Stem flow amounted to 0.8 in saw timber-size stands, 1.2% in pole-size stands, 2.9% in sapling stands, and 0.6% in plantatio shortly after crown closure as compared with precipitation on bare ground. The highest absolut stem flow occurred during periods of light, prolonged rainfall. Stem flow begins only after th initial wetting of the stem is accomplished. This wetting takes a longer time on large trees with great amount of foliage and rough bark than on small trees. After the initial wetting the stem flo is greater on large trees than on small ones. *Subject Headings:* **1. Forest climatology 2. Fores hydrology 3. Forest influences on precipitation 4. Precipitation interception by forests 5. Upp Harz Mountains, Germany.**—*Author's abstract.*

10M–474 551.584.41 551.588.6:551.579(432.2

Delfs, J. and Kiesekamp, H., **Der Einfluss des Waldes und des Kahlschlages auf den Abfluss vorgang, den Wasserhaushalt und den Bodenabtrag: Der Oberflächenabfluss und Erosion.** [Effec of forests and clearings on runoff, water balance and erosion: Surface runoff and erosion.] *Aus de Walde*, Hannover, No. 3:142–174, **1958.** 8 figs., 6 tables, refs. English summary p. 218.—Th relationship of surface runoff and erosion with soil cover and slope gradient was studied on bar ground and under a forest cover in several areas of the Upper Harz Mountains. The measurement were made on 3×1 m plots with a gradient of 35–40% on bare ground and approx. 47% under fores cover. In 1950 on bare mineral soil the surface runoff amounted to 17% and the erosion to approx 1500 g/m². The corresponding figures were for a humus cover 4% and 50 g/m², Aira/Vaccinium-cove 0.2% and 0.0 g/m², and for needle litter 1% and 4 g/m². The erosion increased with the amount o surface runoff. The suspended load of the creeks was measured by continuous sampling. The bed load was measured in bed load traps. The 1950 measurements showed in the clear cut Lange Bramk up to 56.0 km² suspended load and 2.0 m³ bed load and in the forest-covered Wintertal up to 18.6 km suspended load and 0.05 m³ bed load. At normal water flow of up to 30 l/sec/km² both creeks had a suspended load of approx. 5–10 mg/l. This amount increased equally in both creeks with a sudden increase of ground water flow. With a sudden rise of surface runoff in the Lange Bramke the sus pended load reached 550 mg/l whereas in the forest-covered Wintertal much lower values occurred The 1950 measurements on a 278 m long skid trail showed an amount of gravel of 9.2 m³. Hig surface runoffs were measured after summer thunderstorms of heavy rain intensity. Surface runof and erosion were greatly reduced within a few years after the mineral soil became revegetated *Subject Headings:* **1. Forest climatology 2. Forest hydrology 3. Forest influences 4. Surface runoff 5. Soil erosion 6. Upper Harz Mountains, Germany.**—*Authors' abstract.*

10M–475 551.579:551.588.6

Rutkovskiĭ, V. I., **Klimaticheskaia i gidrologicheskaia rol'lesa.** [The climatic and hydrological role of forests.] *Vsesoiuznyĭ Geograficheskiĭ S"ezd, 2nd, Leningrad, 1947, Trudy*, 2:387–405, **1948** 5 figs., 3 tables, 19 refs., eq. **DLC**—In this paper, based on the preliminary results of a study of the problem by the All-Union Scientific Research Institute of Forestry, organized in 1937 (but interrupted by the war), the author attempts to bring to light the causes of the most important differences of opinion on the question, and to devise a new concept which would bring the hydrologic and climatic influences of forests into harmony. The author compares evaporation in forests with evaporation in forestless areas and concludes that only middle-aged and old forests of high productivity have a positive climatic effect, while evaporation of unproductive and young woods does not differ much from evaporation of peat fields. The question of the influence of forests on river runoff is conflicting. In consuming much water for evaporation in summer, forests diminish runoff. The more water is evaporated by forests, the less there remains for runoff. It is not only precipitation that determines the volume of runoff and evaporation since precipitation, in its turn, is determined by evaporation. If forests, which consume much water for evaporation, would really diminish runoff, the large-scale felling of forests in the last century would have increased the annual runoff of rivers. But the contrary is true. The influence of forests on the seasonal distribution of runoff

discussed, including their influence on spring runoff (making up 60–80% of the yearly runoff); snow accumulation; snow melting intensity; freezing and thawing of the ground; absorption of water by the ground; water reserves in the ground; ground water; and spring runoff. The climatic and hydrological effects of forests in the plain are summarized. Forests are classified into 3 groups according to age, kind, productiveness and soil. The 1st category, mixed, productive, over 20–30 year old forests on argillaceous soils, favor the increase of the water content in the air and its cooling because of their consumption of water for evaporation, and are a powerful climatic factor and regulator of river runoff. The climatic and hydrological effect of the 2nd group, dispersed and young woods on clay soils, is important. The 3d group, spruces on sandy soils, favor the accumulation of ground water and raise river runoff. A plan is proposed concerning measures for increasing the climatic, hydrological, and counter-erosion effect of forests. *Subject Headings:* **1. Forest hydrology 2. Forest influences 3. Hydrologic cycle 4. Runoff.**—*A.M.P.*

10M–476 551.579:551.588.6

Sapozhnikova, S. A., **Meteorologicheskie issledovaniia primenitel'no k probleme preobrazovaniia prirody zasushlivykh raĭnov SSSR.** [Meteorological investigations concerning the transformation of the nature of dry regions of the U.S.S.R.] *Voprosy Geografii*, Moscow, No. 23:207–208, **1950.** **DLC**—General outline of past progress (or lack of progress), present status and future plans for studying the climatic conditions of arid regions for the purpose of counteracting drought. In 1950 the Hydrometeorological Service set up a hydrometeorological experiment station at Kamennaia steppe and 5 forest hydrometeorological stations to study the complex hydrometeorological regime connected with reforestation, shelter belts, etc. It is hoped that this will provide data and scientific knowledge to form a basis for improvement over DOKUCHAEV'S work. *Subject Headings:* **1. Forest hydrometeorology 2. Hydrometeorological research stations 3. Kamennaia Steppe, U.S.S.R.**—*I.R.*

10M–477 551.579:551.585.7(497.2)

Dimova, V., **Prouchvane klimata na Rila za opredeliane ottochniia i rezhim.** [Investigation of the climate of Rila Dagh for the purpose of determining its runoff regime.] *Khidrologiia i Meteorologiia*, Sofia, No. 4:3–16, **1956.** 9 figs., tables. Russian and English summaries p. 15–16. **DLC**—Climatic and hydrological characteristics of the various sections of this three-watershed mountain region are described in terms of orography, general circulation characteristics, and especially precipitation distribution as derived from the 33 rainfall stations maintained in the mountain and its vicinity. *Subject Headings:* **1. Mountain climates 2. Mountain hydrology 3. Rila Dagh, Bulgaria.**—*G.T.*

10M–478 551.579:551.588.6(43)

Friedrich, Wilhelm (*Coblenz*), **Über die Wechselwirkungen zwischen Wald und Wasser.** [Mutual relations between forest and water.] *Gas- und Wasserfach*, Munich, 94(22), **1953.** 3 p. 31 refs. Abstracted from reprint. **DWB**—Review of some literature sources on the hydrological effects of forests with a short discussion of problems like the increase in precipitation interception, runoff, evapotranspiration, and ground water. German scientists, interested in these aspects formed a discussion team "Wald und Wasser" (forest and water). *Subject Headings:* **1. Forest influences 2. Forest hydrology 3. Hydrologic research 4. Germany.**—*A.A.*

10M–479 551.584.41(432.2) 551.582.2(432.2) 551.579:551.588.6(432.2)

Schulz, L., **Der Einfluss des Waldes und des Kahlschlages auf den Abflussvorgang, den Wasserhaushalt und den Bodenabtrag: Die klimatischen Verhältnisse der Versuchsgebiete.** [Effect of forests and clearings on runoff, water balance and erosion: Climatology of the experimental areas.] *Aus dem Walde*, Hannover, No. 3:38–62, **1958.** 2 figs., 12 tables, refs. English summary p. 216.—Tables are presented on relative humidity, wind, precipitation, snow cover, temperature, cloudiness and sunshine duration for several areas of the Upper Harz Mountains. The long axis of the Harz Mountains lies perpendicular to the southwest winds which carry most of the rain. The precipitation increases with elevation. The Clausthal weather station, which is in the vicinity of the experiment areas, has recorded a mean annual precipitation of 1349 mm between the years 1891 and 1930. The highest monthly precipitation is in Jan. and July. The mean annual temperature is 5.8°C. The growing season during which there is a daily mean temperature of 5°C covers 187 days (April 17th till Oct. 23) and there is a frostfree period of 169 days (May 3 till Oct. 19). The mean relative humidity amounts to 84%. According to many years of observation, the ground is completely covered with snow, on the average, from Nov. 10–April 23, and the maximum depth of snow occurs in mid-February. During mid-winter thaws the snow blanket may repeatedly vanish and reappear. *Subject Headings:* **1. Forest climatology 2. Forest hydrology 3. Climatological data 4. Upper Harz Mountains, Germany.**—*Author's abstract.*

RUNOFF

Water Supply from Precipitation (551.579.1)

10M–480 551.579.2:551.578.46(252:

Asada, N., **On the effect of Oze-Hara Moors upon the runoff in snow cover period.** *Send Japan. Central Meteorological Observatory, Journal of Meteorological Research of Tohoku Distr* Vol. 12, Memoir No. 6, March **1959.** 4 p. 3 figs., table, 2 refs. Reprint from unidentified sour In Japanese. Title romanized: **Ozehara shitsugen no kasen ryushusu ni taisuru eikyo ni tsui DWB**—Terzaghi's theory of compression of clay is applied to the investigation of the abnorm runoff in the Ozehara moor areas. The clay layer of the Ozehara moors seems to absorb water un the increasing load of snow starts to compress the water-saturated clay layer, eventually causing t release of the water at an abnormal rate during the normally dry season. Data from 1953–19 show that the runoff rate at Ozehara is closely related to snow cover and independent of air te perature. *Subject Headings:* **1. Snow cover-runoff relationships 2. Abnormal runoff 3. Oze-Ha Moors, Japan.**—*J. H. Woo.*

10M–481 551.57

Bradbury, Dorothy L. (*Univ. of Chicago*), **Moisture analysis and water budget in some no developing cases.** *Geophysica*, Helsinki, 6(3/4):179–187, **1958.** 3 figs., 3 refs., 3 eqs. **DWB, DLC** The water budget was computed twice daily over a large area of central and eastern United Stat for a two-week period. With the use of the simplified water balance equation fairly good agreeme was found between the computed and observed amounts of precipitation. The patterns of wat vapor storage were compared with those of the observed precipitation and it was found that, general, the axes of the maximum precipitation areas lie on or to the left of the axes of the patter of water vapor storage. (Run from different source as 9.11–247, Nov. 1958, *Met. Abs.*) *Subj Headings:* **1. Water budget 2. Precipitation amounts 3. United States.**—*Author's abstract.*

10M–482 551.579.1:551.5

Dumitrescu, S., **Pe marginea unor articole privind calculul debitelor maxime.** [Comments some articles on maximum runoff calculation.] *Meteorologia şi Hidrologia*, Bucharest, 1(1):64–6 Oct. **1956.** 1 table, 15 eqs. **DWB**—Two articles by M. Goldstein and M. Constantinescu the calculation of maximum runoff from torrential rain in the absence of hydrometric measuremen are critically reviewed. After a detailed analysis of the formulas proposed and tabular data pr sented by Goldstein and Constantinescu, the author charges that the two writers have given purely mathematical treatment of the problem, ignoring the real nature of the phenomena involve *Subject Heading:* **1. Maximum runoff calculations.**—*G.T.*

10M–483 551.579.1:551.311.31:582.4

Gael', A. G. and Plachinda, A. S., **O poverkhnostom stoke na peskakh.** [Surface runoff c sand.] *Pochvovedenie*, Moscow, No. 4:86–90, **1958.** 3 figs., table, 20 refs. **DLC**—On sands wit dissected relief there occurs surface runoff of spring melt water and especially of summer rain (dow pour) water. This runoff is observed in desert and humid regions both on sands lacking soil an plant cover and on sands possessing soil and plant cover, such as pine groves. Slope runoff in a pir grove of the "high dune knoll" type and the associated washoff and redeposition of sand compris up to two-thirds the area of sand dunes. This process cannot but be reflected in the impoverishmer of the ridges and slopes of the dunes in humus and in clay soil particles and on the other hand in th enrichment of the soil in the depressions between the dunes, where the surface runoff subsides. Th phenomenon of wash-off and redeposition hinders soil formation and is one of the reasons of the wea differentiation of pine grove friable soils on the genetic horizon. To an equal extent the removal an deposition of sand by water influences the evolution of ancient and contemporary relief of sand b smoothing it out. This study on the water and wind erosion of sands was carried out on the righ bank of the Irtysh River and data on the distribution of surface runoff on the sand dunes for give measurements on dune profiles and diagrams illustrating the wash-off and redeposition of sand etc., are presented. *Subject Headings:* **1. Surface runoff in desert 2. Sand dune formation 3. So erosion 4. Irtysh River, U.S.S.R.**—*Authors' conclusions and I.L.D.*

10M–484 551.579.1:551.506(569.4

*Goldschmidt, M. J., **Storm water run-off in Palestine.** *I.U.G.G., International Association c Scientific Hydrology, Oslo, 1948.* [*Transactions*], 1:228–250, [n.d.]. 11 figs., 5 tables. **DWB**— good source of data for the hydrology of Palestine. Annual rainfall averages given for a grea number of catchment areas (period 1901–30), as well as annual surface runoff and the ratio surfac runoff/rainfall for each hydrologic year when records were available (4 to 13 years). The averag ratio is about 5%. Only a few rivers have also dry weather runoff. A list of the most disastrou

floods is added. Numerous graphs show total surface runoff from year to year, probability of annual flow and relationship between rainfall and surface runoff. *Subject Headings:* **1. Hydrologic data 2. Surface runoff 3. Rainfall-runoff relationships 4. Palestine.**—*A.A.*

10M–485 551.579.1(569.4)

Goldschmidt, M. J. and Jacobs, M., **Precipitation over and replenishment of the Yarqon and Nahal Hatteninim underground catchments.** *Israel. Hydrological Service, Hydrological Paper*, No. 3, **1958.** 8 p. 4 tables, map (fold.), 19 refs. **DWB** (M79.1 G623pr)—The water sheds which delimit the underground catchments of the Yarqon and Nahal Hatteninim can be delineated with a rather high certainty. It appears that the base flow of these two rivers represents almost exclusivele the replenishment of the aquifers which occur in the underground catchments of these rivers. R-y liable and continuous data of the base flow and the rainfall over the catchments are available for the period from 1943/44 to 1953/54. The hydrological equation for long term average precipitation and total runoff developed in 1955 for Jordan and Litani catchments has been amended for underground runoff only and has been applied to the underground catchments of the Yarqon and the Nahal Hatteninim. The average 1943/44 to 1953/54 base discharge computed by means of this latter equation from the precipitation over the catchments, averaged over the same period, differed from the actually recorded average flow by 2.3% only. It was also possible to delimit the sub-catchments of the Yarqon and the different sections of the Nahal Hatteninim by means of the hydrological equation, amended for underground runoff. *Subject Headings:* **1. Precipitation runoff 2. Catchment basins 3. Israel.**—*Authors' abstract.*

10M–486 551.579.1:551.577.21(52)

Ichikawa, T. and Shimakawa, K., **The relation between rainfall amount and runoff.** *Journal of Meteorological Research*, Tokyo, 5(3):159–163, March **1953.** 3 figs., 2 tables. In Japanese; English summary p. 159. **MH-BH**—The authors investigated the relation between rainfall amount and runoff on the basis of 39 data obtained near the observation field of Nagoya Observatory. As a preliminary conclusion it is stated that runoff is greatly influenced by season. *Subject Headings:* **1. Rainfall amount 2. Runoff 3. Nagoya, Japan.**—*Authors' abstract.*

10M–487 551.579.1(47) 551.579:512

Kalinin, G. P. and Podvishenskaia, N. Ia., **Opredelenie ob"ema dozhdevogo stoka v rechnykh basseĭnakh.** [Determination of the volume of rainfall runoff in river basins.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 48(75):52–71, **1956.** 6 figs., 6 tables, 10 refs., 6 eqs. **DLC**—In this study of the amount of rainfall runoff in river basins the authors examine the widespread instances when the principal runoff losses are the result of infiltration and the losses due to evaporation of slope flow are negligible. The problem is solved in two stages, namely, determination of runoff from elementary areas and determination of runoff during the course of the runoff to the channel network. The principal factors determining the infiltration of water in river basins are the duration and intensity of precipitation, and state of soil moisture preceding precipitation. The principal losses of rainfall runoff during infiltration occur during the period of rainfall. The variation of the intensity of infiltration from elementary slopes can be determined by formulas developed by G. N. Alekseev, N. F. Bronovitskaia and A. N. Kostiakov. The formula for the infiltration curve is in the form—$i_{inf} = i_0 + A/\sqrt{t}$ where i_0 = final intensity of infiltration and $A = \sqrt{0.5\ HKD - H}$ = capillary pressure, D = soil moisture deficit. The mean rate of infiltration is computed from the formula $i_{inf} = i_0 + (2A/\sqrt{Td})$ and $A = (i_{inf} - i_0/2)\sqrt{T_D}$ where T_D = duration of precipitation. These relationships on the formation of rainfall runoff were applied to determining the relations between runoff losses, intensity and duration of precipitation and the preceding condition of the basin of the Maikhe River with a basin area of 840 km². The results of the analysis are presented. *Subject Headings:* **1. Rainfall runoff 2. Runoff calculations 3. U.S.S.R.**—*I.L.D.*

10M–488 551.579.1(481)

Klaeboe, H. (*Oslo*), **Hydrological conditions in Norway.** *International Union of Geodesy and Geophysics. I.U.G.G. Association of Scientific Hydrology, Oslo, 1948*, [*Transactions*], 1, [pub. **1950**]. p. 26–32. **DWB**—Discussion of geographical distribution of runoff, its seasonal and diurnal variations, and annual fluctuations. Runoff map for Norway presented. Precipitation measurements seem to be unreliable, if compared with runoff. *Subject Headings:* **1. Runoff variations 2. Runoff maps 3. Norway.**—*A.A.*

10M–489 551.579.1:551.588.2

Kozmenko, A. S. and Ivanovskiĭ, A. D., **Rezhim poverkhnostnogo stoka v tsentral'noĭ lesostepi.** [Surface runoff regime in the central forest steppe.] *Gidrotekhnika i Melioratsiia*, Moscow, No. 1:3–18, **1953.** 18 figs. **DLC**—This general summary of topographic conditions governing surface

runoff discusses water erosion and formation of gullies, runoff from melting snow, effect of drainag and of methods of plowing on snow retention. The planting of forest shelter belts greatly improve the microclimate and microhydrologic conditions. *Subject Headings:* **1. Runoff regime 2. Topo graphic effects 3. Microhydrology.**—*A.A.*

10M–490 551.579.1:551.501(477

Kubyshkin, G. P., **Doslidzhennia maksimal'nykh doshchovykh vitrat richok zakarpats'ko oblasti URSR.** [Maximum precipitation runoff in Transcarpathian rivers.] *Akademiia Nau Ukrain'skoï RSR, Kiev, Dopovidi*, No. 3:265–268, **1957.** 2 figs., ref., 5 eqs. Russian and English summaries p. 268. **DLC** (Slavic)—It is shown that there exists a rather clear dependence betwee maximum rain discharge measured at 18 water gage points of Transcarpathian rivers and the drainag area which can be expressed by the proposed empirical formula suitable for approximate computation In order to take into account, besides the basin area, other local factors, such as slope, average width etc, certain simplifications are introduced in the DGIEVSKY formula which, in the present state, give acceptable results and may be recommended for the computation. *Subject Headings:* **1. River discharge correlations 2. Runoff calculation 3. Transcarpathia.**—*A.M.P.*

10M–491 551.579.1(47)

Luchsheva, A. A., **Vosprosy stoka Meshcherskoï nizmennosti.** [Problems of run-off of the Meshchera Depression.] *Meteorologiia i Gidrologiia*, No. 2:35–38, Feb. **1957.** fig., table, 13 refs. **DWB, DLC**—The water balance and the runoff regime of the Meshchera River are analyzed. The physiography of the Meshchera depression, the various physiographic factors (relief, lakes, swamps, etc.) influencing the formation and distribution of runoff, and the precipitation and temperature characteristics are discussed. Data are given on the length and distance from the mouth of the individual rivers, area of the river basins, and percentage of lakes, swamps and forest of each basin. A detailed map of isolines of annual runoff (l/sec/km²) in the Meshchera depression is presented. *Subject Headings:* **1. Hydrologic balance 2. Runoff analysis 3. Meshchera Basin, U.S.S.R.**—*I.L.D.*

10M–492 551.579.1:631.61(584.6)

L'vovich, M. I.; Aref'eva, V. A. and Kuznetsov, H. T., **Ob izmeneniiakh stoka v raïonakh osvoeniia tselinnykh zemel' i sviazannye s etoï problemoï zadachi gidrologii kak geograficheskoï nauki.** [Changes in the runoff in the virgin land development areas and tasks confronting hydrology as a geographical science.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geograf.*, No. 1:80–91, **1957.** 5 tables, 11 refs. **DWB**—The changes in the formation of runoff in the nourishment of rivers in the Altai Region and Northern Kazakhstan resulting from the cultivation of virgin and waste land is examined on the basis of runoff data obtained in the southern Trans-Volga region, the physiography of which resembles the virgin land region. The results of studies of runoff from cultivated and waste land showed that, both from fields and water catchment areas, the runoff from plowed land is considerably less than from waste land. From fields plowed crosswise on a slope the runoff was ten times that from waste land and only when the ground was covered by solid ice did the runoff from the former increase, but its runoff coefficient was still smaller than that of the waste land. The conclusion is reached that under given conditions, the cultivation of soil is a more important factor in the formation of runoff than differences in snow deposits. In the application of these results to virgin lands, a detailed comparison is made between the relief, soil, plant cover and climatic conditions of Northern Kazakhstan and the Trans-Volga region. The effect of cultivation on runoff from virgin and waste lands is estimated and it is shown that in cultivation of all waste land the runoff will decrease by 80% but actually since not all the land will be cultivated the runoff will be diminished by about 60%. The cultivation of virgin land when complete will reduce the runoff by 60%. Numerical data are presented on runoff from cultivated and virgin soils. *Subject Headings:* **1. Runoff from virgin land 2. Runoff from cultivated fields 3. Runoff decrease 4. Kazakhstan, U.S.S.R. 5. Trans-Volga region, U.S.S.R.**—*I.L.D.*

10M–493 551.579.1(492.66)

Netherlands. State Institute for Water Supply, **The effect of the yearly fluctuations in rainfall on the flow of ground-water from an extended area of recharge.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Oslo, 1948*, [*Transactions*], Vol. 3, [pub. **1950**]. p. 47–56. 3 figs., 6 refs., 28 eqs. **DWB**—Assuming that precipitation minus evapotranspiration in the catchment area of the Eem Lake (one of the remainders from the Zuyder-See) varies as a sine within the year, the problem of water supply to this lake is treated mathematically by analogy formulas governing tidal propagation in ground water. The lag in the phase is about 3 months. Results are compared with model experiments. *Subject Headings:* **1. Water supply 2. Rainfall effects 3. Hydrologic cycle 4. Eem Lake, Netherlands.**—*A.A.*

10M–494 551.577.1:551.579.4(678.2)

Otnes, Jacob, **Hydrological data on some rivers in the Chimala area.** *East Africa High Commission. Rufiji Basin Survey. Hydrological Section, Progress Report*, No. 6, May **1958.** 16 p. 8 tables. Reproduced from typescript. **DWB** (M79.4 E13pr)—Rainfall and runoff data (1940–57) for stations in the SW part of the Rufiji Basin, and evaporation, dew point, dry bulb, wet bulb, and relative humidity data for Igawa and Rujewa trial farms for 1956, 1957 and part of 1958, are presented in tables with some discussion. Rainfall data are obtained by planimetering on an isohyetal map. *Subject Headings:* **1. Rainfall-runoff data 2. Hydrological data 3. Rufiji Basin, Tanganyika.**—*M.R.*

10M–495 551.579.1(282.255)

Shcheglova, O. P., **K voprosu o dozhdevom pitanii rek Sredneĭ Azii.** [The problem of the rainfall alimentation of Central Asian rivers.] *Tashkent. Geofizicheskaia Observatoriia, Trudy*, No. 10(11):108–111, **1954.** 4 figs., 2 refs. **DLC**—A detailed study of the problem carried out by the author for 5 mountain rivers during warm and humid years (1933–1934, 1938–1939 and 1940–1941) showed that the part of rainfall alimentation in regard to the total discharge of these rivers does not exceed 15%. *Subject Headings:* **1. River discharge 2. Runoff 3. Hydrology 4. Central Asia, U.S.S.R.**—*A.M.P.*

10M–496 551.579.1(453.1)

Tonini, Dino (*Società Adriatica di Elettricità, Venice*), **Carte des écoulements relatifs aux cours d'eau d'une région de l'Italie Nord-Orientale (Cartes des isoplèthes).** [Map of relative runoff with respect to watercourses of a region of Northeast Italy, with isopleths.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Brussels, 1951*, [*Transactions*], Vol. 3, pub. **1952.** p. 275–277. 2 diagrs. **DWB**—Maps of runoff in Venezia are presented for the year. Summer and winter annual runoff varied between 25 and 45 l/sec km². *Subject Headings:* **1. Runoff 2. Venezia, Italy.**—*A.A.*

10M–497 551.579.1(45)

Tonini, Dino, **On the research of a characteristic time of runoff.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Oslo 1948*, [*Transactions*], Vol. 1, [pub. **1950**]. p. 131–139. 3 figs., 3 tables. **DWB**—Author computed average rainfall and runoff for each decade of the period 1927–46 over the catchment area of the Asiei River above Auronzo and derived correlation coefficients between these values for 18 successive decades. Characteristic time of runoff, characterized by a maximum correlation, averages about 12 decades depending on the season; data are given for the set of correlation coefficients and the average decadal runoff, rainfall and temperature for the whole period. *Subject Headings:* **1. Runoff lag 2. Hydrologic cycle 3. Asiei River, Italy.**—*A.A.*

10M–498 551.588.2:551.579.1(957)

Troxell, Harold C., **The influence of certain physiographic features on flood runoff in Southern California.** *I.U.G.G. Association of Scientific Hydrology, Brussels, 1951*, [*Transactions*], Vol. 4, pub. **1952.** p. 131–139. 3 tables, diagr. **DWB**—Author discusses flood runoff in 20 mountain catchment areas with an average slope from 23 to 47%, comparing mean storm precipitation with mean maximum 5-day runoff. Precipitation and temperature data are given for a few key stations. *Subject Headings:* **1. Orographic influences 2. Flood runoff 3. Southern California.**—*A.A.*

10M–499 551.579.1/2(47)

Velikanova, T. I., **Vesenniĭ stok i osobennosti ego formirovaniia v usloviiakh severnoĭ chasti Evropeĭskoĭ territorii SSSR.** [Spring runoff and the characteristics of its formation under conditions prevailing in the northern part of European U.S.S.R.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 54:78–100, **1957.** 8 figs., 24 refs. **DWB, DLC**—On the basis of extensive observations on runoff, snow storage and precipitation, and contemporary concepts of the physical processes of runoff formation and absorption and retention of water by river basins, the author examined the factors determining the formation of spring floods of 25 river basins of northern European Russia. The physical geography of the area including topography, geology, general atmospheric circulation, distribution of precipitation, snow-cover regime, climatic zones, soils and hydrography is presented. The determination of the basic elements in the formation of spring runoff is based on calculation of the elements of the water balance, so that the spring runoff, the variation of snow cover, including snow storage distribution, and the variation of snow storage in forest and field, precipitation and atmospheric temperature, soil moisture and soil freezing and thawing, and absorption and retention of meltwater by river basins are analyzed with the aid of observational data presented in tables and relevant equations. The results of this study indicate that the fundamental elements in spring runoff in the river basins of N. European Russia are snow accumulating in the catchment basin

during winter and precipitation during the flood period; the maximum snow storage in forests at tl end of winter exceeds that in open areas by 10–15%. Spring rains during the formation of sprin floods can constitute 20–40% of the magnitude of maximum snow supplies and are a fundamenta element in the water balance of northern rivers. The principal losses of spring runoff in the catch ment areas of highly forested, swampy areas and in basins having many lakes consists of the retentio of water by surface inequalities, by underbrush, etc. In the Onega, Vyma and Izhma basins kars exerts a considerable effect on water losses. *Subject Headings:* **1. Runoff 2. Snow melt 3. U.S.S.R** —*I.L.D.*

10M–500 551.577:551.579.1(436

Zawadil, Rudolf, **Niederschlag und Abfluss.** [Precipitation and runoff.] *Wetter und Leben Vienna*, Sonderheft, No. 2:38–40, Sept. **1953.** 2 figs. **DLC**—The relation between rainfall an runoff is discussed and the coefficient of runoff defined and exemplified. Two cases from cloudburst in Austria are analyzed and the hourly rainfall-runoff relations shown graphically: one—th catastrophic flood of May 11, 1951 (rainfall at Kasten and hydrograph at Siegersdorf), and th other—the cloudburst on June 19–20, 1951 (same stations), which did not cause any great floo because the ground was dry and absorbed water rapidly. *Subject Headings:* **1. Rainfall-runof relationships 2. Flood hydrographs 3. Austria.**—*M.R.*

Water Supply from Snow Cover (551.579.2)

10M–501 551.579.2:551.525.2

Allison, Isabelle D., **Melting of deep snow packs by conduction of heat from the ground.** U. S Corps of Engineers, Snow Investigations Project Cw-171, Technical Bulletin, No. 16, June 4, 1954 9 p. chart, tables, 11 refs. **DWB** (M79.2 U582e)—A quantitative evaluation of melting was made from data obtained at the Central Sierra Snow Laboratory during the 1952–53 water year. The study was limited to periods when the snow pack was over 3 ft deep. A melt of 3.26 in. water equivalent caused by the conduction of heat from the ground occurred at station 3 during the period Jan.-June 9. The rate of melt increased with time, even with a decrease in temperature gradient, because of the rise in thermal conductivity of the soil from increased moisture content. *Subject Headings:* **1. Snow melt 2. Soil temperature influences. I. U. S. Corps of Engineers. Snow Investigations II. Project Cw-171.**—*SIPRE Abstract 8603.*

10M–502 551.579.2:551.321.7 551.578.46:537.226

Ambach, W. (*Innsbruck Univ.*), **Zur Bestimmung des Schmelzwassergehaltes des Schnees durch dielektrische Messungen.** [Determination of water content of snow by means of dielectric measurement.] *Zeitschrift fur Gletscherkunde und Glazialgeologie*, Innsbruck, 4(1/2):1–8, **1958.** 3 figs., table, 7 refs. German and English summaries p. 7–8. **DWB, DLC**—By measuring the capacity of a plate condenser filled with a mixture of snow and water one is able to determine the water content of this mixture. The capacity is measured by means of a bridge in which the condenser to be measured is substituted. The plates of the condenser are sealed in plexiglass, in order to insulate them for direct current. The experiments brought out the capacity and the loss-angle to be a function of frequency in the range of 10^3 to 10^5 cycles. So far, measurements are indicating a linear increase of capacity of approximately 30 pF for an increase of water content by 1 percent volume. The original capacity (dry snow) has been 50 pF. *Subject Headings:* **1. Water content of snow 2. Dielectric snow measurement.**—*Author's abstract.*

10M–503 551.579.2

Anderson, Henry W. (*Forest Service, Berkeley, Calif.*), **Progress in snow management research in California.** *Western Snow Conference, April 1958, Proceedings*, 26:12–21, Oct. **1958.** 2 figs., 4 tables, 7 refs. **DWB** (M(06) W527p)—The California Forest and Range Experiment Station of the U. S. Forest Service has conducted snow studies on the west side of the Sierra Nevada and in the Cascade Range in order to develop and test methods of managing the snow zone for improved water yield. Federal and state, as well as private agencies, have cooperated in the attempt to solve the problem. Details on the study are included in this communication. *Subject Headings:* **1. Snow management 2. Water supply from snow.**—*N.N.*

10M–504 551.579.2

Darman, Z. I., **Vodootdacha pri snegotaianii.** [Water yield during snow melt.] *Moscow. Tsentral'nyi Institut Prognozov, Trudy*, No. 54:62–77, **1957.** 6 figs., 2 tables, 18 refs. **DWB, DLC**—The author attempts to estimate quantitatively the role of factors determining water yield during snow melt and the accumulation of meltwater on the surface of a catchment basin and to indicate the experiments and observations necessary for this purpose. The principal characteristics of the

movement of meltwater in a snow cover, such as capillary and gravitational movements, the dependence of the amount of captive water within a snow cover upon snow melt and snow structure, and of the accumulation of gravitational water upon soil permeability, slope, the presence of closed and partly closed depressions, etc. are discussed. A theoretical analysis is presented of the relationships among various characteristics of snow such as density, moisture content, and mass of ice crystals during the melting period; and computation of water yield during snow melting. Data on the daily total water yield from snow melt are presented and equations for computing the meltwater supply in a water catchment basin are developed. The moisture content of snow established during a long interruption of melting in the layer situated above the zone of capillary moisture is determined chiefly by the amount of captive moisture present in the snow in a relatively stationary condition. In fine-grained snow it is greater than in coarse-grained snow. Supplementary moisture arising in this layer during snow melt is directly proportional to the rate of melting and inversely proportional to the mean velocity of the vertical flow of meltwater through snow. The gravitational and capillary water in the lower layers of snow begin to form somewhat earlier so that the moisture of the entire layer attains the value of snow moisture. Data on snow moisture and the vertical velocity of meltwater through snow facilitate, by means of the computed course of snow melt, the determination of snow moisture and variation of water yield and, conversely, observations on water yield for small water impermeable transporting areas facilitate the computation of the variation of snow melt. The parameters of snow moisture and vertical flow of water through snow for different structures of snow as a function of the size of snow particles may be determined more accurately on the basis of water yield and snow moisture in the case of a stable snow melt regime. *Subject Headings:* **1. Snow melt runoff 2. Snow melt calculation 3. Water supply from snow.**—*I.L.D.*

10M–505 551.579.2(78)

Friedrich, C. Allan (Div. of Flood Control Surveys), **Factors that determine spring runoff in the Northern Rocky Mountains.** *U. S. Forest Service. Northern Rocky Mountain Forest and Range Experiment Station. Missoula, Montana, Research Note*, No. 123, Aug. **1953.** 5 p. **DA**—Analyzing snow and weather conditions in comparison to spring runoff in 1948, 1950 and 1953, the author comes to the conclusion that the peak runoff is largely determined by the weather during melting. *Subject Headings:* **1. Snow melt runoff 2. Rocky Mountains 3. Columbia River Basin.**—*A.A.*

10M–506 551.579.2:551.588.6

Gariugin, G. A., **Vesennìĭ stok v zavisimosti or sostoianiia poverkhnosti pochvy.** [Dependence of spring runoff on the condition of the soil surface.] *Meteorologiia i Gidrologiia*, Moscow, No. 3:40–42, May/June **1955.** fig., 2 tables. **DWB**—The results of six years of observation on different fields with typical field crops and with similar slope and soil lead to the conclusion that in the Azov region spring runoff on watershed slopes with grades of 0.01°–0.02° is formed chiefly in fields of winter wheat, perennial grains, and fallow areas. From ploughed fields, meltwater runoff was usually absent, even when the runoff coefficients from other fields were large. *Subject Headings:* **1. Vegetation influences 2. Snow melt runoff.**—*I.L.D.*

10M–507 551.509.329:551.579.2

Hannaford, J. F.; Wolfe, C. G. and Miller, R. W. (*all, Calif. Dept. of Water Resources*), **Graphical method for determination of area-elevation weighting of snow course data.** *Western Snow Conference, April 1958, Proceedings*, 26:73–82, Oct. **1958.** 9 figs. **DWB** (M(06) W527p)—The authors discuss the five major variables that have been used by the California Cooperative Snow Survey in predicting the run-off during the April–July snowmelt period on a typical Sierra drainage basin. The results are based on the snow survey records in the area during a period of 28 years. The methods used, the problems encountered, and the basic considerations in the evaluation of snowpack in the basin as well as a revised scheme are discussed. *Subject Headings:* **1. Snow melt runoff forecasting 2. California.**—*N.N.*

10M–508 551.579.2:551.482(82)

Heinsheimer, G., **On the relation of precipitation accumulation and melting of snow to the stream flow in the San Juan River, Argentina.** *International Union of Geodesy and Geophysics, International Association of Scientific Hydrology, Oslo, 1948*, [*Transactions*], Vol. 2, [pub. **1950**]. p. 101–108. fig., 3 tables. **DWB**—Effect of precipitation 1913–1937, of snow melt and runoff on stream flow in San Juan Basin is discussed, with charts and tables. River data for 1910–1946 used. *Subject Headings:* **1. Snow melt runoff 2. Precipitation effects 3. River flow 4. San Juan River, Argentina.**—*M.R.*

10M–509 551.579.2(520)

Inawashiro, Japan. Weather Station, **On the snow survey around the Urabandai Lakes.** *Journal of Meteorological Research*, Tokyo, 4(10):777–792, Feb. **1953.** 23 figs., 7 tables, refs.,

5 eqs. In Japanese; English summary p. 48–49.—This survey was conducted to estimate th amount of water available in the Urabandai lakes for hydroelectric power. The data collecte include snow density and water equivalent of snow at different heights along a number of profile Runoff is related to annual variation of temperature. Finally, changes of water level in Lake Hibar are related to precipitation at neighboring stations in winter and spring. *Subject Headings:* **1. Wate supply from snow 2. Snow cover 3. Urabandai Lakes, Japan.**—*C.E.P.B.*

10M–510 551.579.2(47

Komarov, V. D., **Osnovnye faktory vesennego stoka.** [Basic factors of spring runoff.] *Lenin grad. Tsentral'nyĭ Institut Prognozov, Trudy*, 2(29):34–44, **1947.** 5 figs., table, eqs. **DLC**—Thi distribution of the annual discharge of Soviet European rivers is mainly determined by the dis tribution of spring runoff, which comprises more than 50% of the annual runoff. In this paper th author discusses the importance of the principal factors affecting spring runoff on the basis of reliabl observational data on snow cover, the state of the ground before melt, snow melting intensity, etc. in the Oka River basin. After having pointed out that spring runoff is made up of water reserve in the snow cover at the beginning of snow melting plus precipitation amount during the thawing and runoff periods, the author discusses individually the losses of melt water resulting from accumula tion on the surface of the basin, infiltration and evaporation. The comparatively small losses due to infiltration (when runoff takes place over frozen or sufficiently moistened soils) and evaporation during snow melt, and the considerable losses caused by infiltration of temporarily accumulate waters in surface depressions show the importance of runoff losses caused by such durable factors a relief, degree of afforestation and swampiness of the land, while such changeable factors as meteoro logical conditions in spring are of secondary importance. *Subject Headings:* **1. Snow melt runoff 2. Snow cover 3. European U.S.S.R.**—*A.M.P.*

10M–511 551.579.2(470)

†Komarov, V. D., **Osnovnye zakonomernosti raspredeleniia koeffitsientov stoka snegovogo polovod'ia i poter' talykh vod v period taianiia na Evropeĭskoĭ territorii SSSR.** [Fundamental regularities in the distribution of snow-flood runoff coefficients and loss of meltwater during the melting period in European Russia.] *Meteorologiia i Gidrologiia*, Leningrad, No. 3:28–33, March **1958.** 2 figs. (maps), 22 refs., 4 eqs. **DWB, DLC**—The mean loss of meltwater increases from the west to the east in European Russia as a result of the decreased pre-winter soil moisture and hence iciness. The mean depth of soil freezing at the end of winter increases from west to east. Increased loss of melt water in the central part of the Russian plain is explained by the considerably greater woodedness and sandy soils. The soil moisture height of standing ground water, soil moisture during the pre-winter and winter period of the forest regions of European Russia are discussed, and it is concluded that in the forest zone total losses of meltwater in the case of the usually excessive soil moisture cannot be considerable and they amount merely to a water layer of about 30 mm. The runoff coefficient in European Russia varies from 0.3 in the south and southeast to 0.85 in the north. According to these data the highest observed total losses are about 100 mm. The calculation of the coefficient of variation of runoff on the basis of the coefficients of variation of its main components is discussed and maps showing mean secular loss of meltwater and mean coefficient of runoff of snow floods are presented. *Subject Headings:* **1. Snow melt runoff distribution 2. Runoff coefficients 3. Infiltration 4. Snow melt floods 5. European U.S.S.R.**—*I.L.D.*

10M–512 551.509.329 551.579.2(584/584.8)

*Kozik, E. M., **K voprosu o roli snezhnikov v pitanii gornykh rek Srednei Azii.** [The role of snow fields in the alimentation of mountain rivers of Central Asia.] *Tashkent. Geofizicheskaia Observatoriia, Trudy*, No. 10(11):176–191, **1954.** 11 tables, 2 refs., 4 eqs. **DLC**—Methods and results of an attempt to obtain approximate quantitative evaluations of the role of snow fields in the alimentation of the Kzylch River in mid-summer, made on the basis of materials obtained during a joint expedition of Tashkent Scientific Research Geophysical Observatory and the Institute of Construction of the Uzbek Academy of Sciences in June–Aug. 1953, are presented and discussed. It has been found that the role of snow fields in the alimentation of the Kzylch River decreases towards the end of summer. *Subject Headings:* **1. Snow melt runoff 2. Runoff forecasting from snow pack 3. Asiatic U.S.S.R.**—*A.M.P.*

10M–513 551.579.2:551.509.329(520) 551.579.2(520)

Ogasahara, K. (*Specialists Committee of Yamagata Prefecture*), **Floods due to melting of snow and control of floods by dam.** *Geophysical Magazine*, Tokyo, 28(4):485 498, Sept. **1958.** 2 figs., 4 tables, 8 refs. **DWB, DLC**—The purpose of the study was to obtain data for predicting floods of the Ohtori River, upper tributary of the Akagawa River, for purposes of power generation and flood control. The maximum water equivalent of snow was estimated from field surveys conducted

twice in 1956 and 1957, each at the end of March. The quantity of inflow into the Arasawa Dam was estimated from the day-value (the averaged value of hourly observations) and the total areal precipitation was estimated from records at five points of low elevation (Yakuwa, Ohtoriyama Mine, Ohtori, Kamitazawa, and Hongo). Floods caused by melting of snow were analyzed from the standpoint of the air mass theory, using actual heat (atmospheric temperature) and latent heat (dew-point temperature) as parameters. However, because of the complexity of the factors that govern snow melting, there still remain many problems to be solved. The melting of snow from the standpoint of the air mass theory and the analytical method used in the study to determine the disappearance of snow (according to elevation) can be applied to the prediction of floods caused by melting snow that take place in the wide snowy areas of Japan facing the sea of Japan. *Subject Headings:* **1. Flood analysis 2. Snow melt floods 3. Flood forecasting 4. Japan.**—*From author's "Foreword."*

10M–514 551.579.2

*Peasley, Phyllis; Garstka, Walter U., and Goodell, B. C. (*Denver and Ft. Collins, Colo.*), **Progress in snowmelt investigations at the Fraser Experimental Forest.** *Western Snow Conference, Proceedings, 17th Annual Meeting, April 1949.* p. 23–28. 4 charts, table. **DWB**—Report deals with performance of shielded precipitation storage gages, graphical methods of converting daily max. and min. temperature data to degree days, analysis of rate of snow melt, calculation of evaporation losses from snow, and analysis of data from snow melt hydrographs for runoff determination. Data for St. Louis Creek showed that an average of 12% of a day's snow melt was realized in stream flow that day, the rest contributing to flow for several months. A method of forecasting the shape of the hydrograph each day, based on snow melt is described. Meteorological factors are correlated graphically with runoff. *Subject Headings:* **1. Snow melt investigations 2. Degree-day computations 3. Shielded snow gages.**—*M.R.*

10M–515 551.579.2:551.482:551.578.46(540)

Pramanik, S. K. and Rao, K. N., **Relationship between snow accumulation and river discharges in India.** *Irrigation and Power*, Simla, 10(1):104–106, Jan. **1953.** 2 refs. **DWB**—Statistical relation between snow accumulation in the Himalayas and discharge of the Ganga, Yamuna and Punjab Rivers is studied. Most of the discharge in July–Sept. is from rain in these areas. *Subject Headings:* **1. River discharges 2. Snow accumulation 3. India.**—*M.R.*

10M–516 551.579.2:628.11

Sartz, Richard, **Snow and frost measurements in a watershed-management research program.** *U. S. Forest Service. Northeastern Forest Experiment Station, Upper Darby, Pa., Station Paper*, No. 96, **1957.** 9 p. 3 figs., 3 refs. **DWB** (M79.2 U58sno)—A report on the work done in 1955–56 by the Northeastern Forest Experiment Station at the Hubbard-Brook Experimental Forest, N. H., on watershed (forest-streamflow) management research. The work here is similar to that being conducted at the San Dimas (Calif.), the Coweeta (N. C.) and Frazer (Colo.) Experimental Forests. The winter program consists of streamflow recording and periodic measurement of frost and snow at different elevations and studies of small plots to find out the effect of differential cutting on depth of soil freezing or snow melt accumulation sites. The measuring procedures, results of the 1955–56 frost survey and snow pack survey, comparison of catch by snowbound gage and snow pack measurements, and effect of elevation are discussed. *Subject Headings:* **1. Watershed management 2. Altitude effects 3. Forest influences 4. Snow melt in forests 5. Hubbard-Brook Experimental Forest, N. H.**—*M.R.*

10M–517 551.579.2:551.588.6

Sukharev, I. P., **Vodoreguliruiushchaia rol' lesnykh polos.** [The role of shelter belts in water regulation.] *Les i Step'*, Moscow, 10:22–31, **1951.** 4 tables, fig. **DLC**—Long period observations made in gulley catchment areas in Kamennaia Steppe show that the springtime runoff ratio decreases from 0.60 for steppe to 0.16 for an area with 18% forests. Observation on 10 experimental plots show similar results. Comparative infiltration data are given for the soil in a young and old shelter belt, as well as on fallow. *Subject Headings:* **1. Snowmelt runoff 2. Forest influences 3. Shelterbelts 4. Kamennaia Steppe, European U.S.S.R.**—*A.A.*

10M–518 551.579.2 551.321.7

*Takahashi, Hiroharu and Enju, Kayoko, **On the measurement of water content of snow by electric calorimeter.** *Seppyo* (*Snow and Ice*), Tokyo, 12(6):189–195, **1951.** tables, diagrs. In Japanese. **DWB**—A preliminary experiment to measure water content of snow giving extensive data in tables. *Subject Headings:* **1. Water content of snow 2. Electric calorimeters.**—*H. Arakawa.*

10M–519 551.501.4:551.579.2(472)

Timofeev, N. A., **Nekotorye zakonomernosti taianiia snega v usloviiakh Leningradskoĭ oblasti.** [Certain characteristics of snow melting under conditions of the Leningrad region.] *Leningrad.*

Glavnaia Geofizicheskaia Observatoriia, Trudy, 77:20–33, 1958. 9 figs., table, 4 refs., 21 eqs. **DWB DLC**—The method of calculating the intensity of snow melt consists of computing the heat balance of the snow surface since the latter can be divided into two components, namely the radiation heat exchange $W\odot$ and the heat exchange with the atmosphere W_T, $W = W\odot + W_T$. In order to make the problem more exact and to compute the intradiurnal variation of snow melt intensity, the author took into account the effect of stratification upon the process of heat exchange between the snow surface and the atmosphere during the period of snow melt. The derivation of the computational formula and the construction of a nomogram are presented. Proceeding from Prandtl's formula

$$\tau = \tau_0 = \rho l^2 \left(\frac{\partial u}{\partial z}\right)^2 = k\rho \frac{du}{dz} = \text{const}$$

where τ = indirect shear, ρ = density, l = mixing path, u = wind velocity and k = coefficient of turbulence; the author derives the equation for $t_2 < 0°C$

$$W_T = a_1 [(t_2 - t_s) + 1.75(\rho_2 - \rho_s)] u_2 \text{ cal/cm}^2 \text{ hr}$$

and for $t^2 > 0°C$

$$W_T = a_3 [t_2 + 1.75(\rho_2 - 6.1)] u_2 \text{ cal/cm, hr.}$$

The coefficient a_1 in these formulas depends on the parameter ε (parameter of stratification) which is determined from the equation $\epsilon = a(\epsilon)(t_2 - t_s/u_2^2)$. All the values in these equations can be determined from meteorological observations, *viz*: (1) air temperature in the shelter t_2; (2) surface temperature t_s; (3) absolute atmospheric humidity in the shelter in l_s; (4) maximum water vapor tension at the snow surface e_s, and (5) wind velocity at 2 m. The construction of the nomogram is illustrated. The results of computations of snow melt intensity at Kaltushi station in the spring of 1957 are graphed. *Subject Headings:* **1. Snow melt calculation 2. Leningrad, U.S.S.R.**—*I.L.D.*

10M–520 551.510.42:551.579.22

Trushin, V. F., **Rezhim taianiia snega i intensivnost' vesennego zhidkogo stoka pri sploshnom pokrytii snega chernym poroshkom.** [Snow-melt regime and rate of spring water runoff after uniform covering of the snow with black dust.] *Meteorologiia i Gidrologiia*, Leningrad, No. 3:44–45, March **1957.** table, 10 refs. **DWB, DLC**—After reviewing Russian work on the use of black dust on snow in order to conserve soil moisture, the author discusses the results of experiments with blackened snow carried out in Tula Oblast during 1952 and 1953. For fields with blackened snow and for control fields, the author gives the beginning and end of spring water runoff, duration of runoff, water reserve on fields at the beginning of snow melt, intensity of runoff, and runoff. Uniform blackening of snow hastens the beginning of snow melt (even at negative air temperature), increases the duration of snow melting and diminishes the intensity of runoff. Snow blackening yields positive results only when the entire field is covered with a deep snow cover at the start of spring snow melt. *Subject Headings:* **1. Dust effects on snow melt 2. Runoff modification.**—*I.L.D.*

10M–521 551.579.2

Uryvaev, P. A., **Vliianie ledianoĭ korki na stok talykh vod po sklonu.** [Effect of an ice crust on the runoff of meltwater on a slope.] *Meteorologiia i Gidrologiia*, No. 9:39–41, Sept. **1956. DWB, DLC**—A description is given of the experimental procedure for studying the flow of meltwater under an ice crust. The experiments were carried out during the period 1952–1955 in the Valday Hills. Only an ice crust with a thickness of 50 mm or more perceptibly influences the loss of meltwater from slopes by increasing the flow coefficient by 30%; the maximum runoff of meltwater on slopes may be raised by 50%. In case of an average crust thickness of 20–30 mm on slopes completely covered by the ice crust and on slopes where more than $\frac{2}{3}$ is covered by the ice crust, the coefficient of meltwater, the maximum runoff and even the flow formations are the same. An ice crust less than 10 mm thick does not affect the loss of melt water from slopes or its formation. *Subject Headings:* **1. Runoff research 2. Ice crust effect on runoff 3. Snow melt runoff.**—*I.L.D.*

10M–522 551.579.2:551.588.2

*U. S. Corps of Engineers, **Additional studies of the influence of terrain characteristics on snowpack water equivalent.** *U. S. Corps of Engineers. Snow investigation Research Note*, (unnumbered), June 5, **1953.** 8 p. 2 plates, 3 tables. **DWB**—Additional studies of the influence of the topographic characteristics of elevation, slope, aspect, vertical curvature, exposure, and vegetation on the distribution of snowpack water equivalent in a small mountain watershed tend to bear out previous findings that water equivalent is generally greater at locations of high elevation, flat slope, northerly aspect, and restricted exposure, though the relative importance of the different characteristics in their effect on water equivalent appears to be somewhat different from that found in the previous studies. The new studies incorporated data from 15 additional stations, and, in contrast to results

of the earlier studies, there appeared to be a marked similarity in the influence ascribed to each topographic characteristic at different dates in the spring season. *Subject Headings:* **1. Snow melt runoff 2. Mountain hydrology 3. Topographic effects.**—*Author's abstract.*

10M–523 551.579.2:551.524.36

Weiss, Leonard L. and Wilson, Walter T., (*both, Hydrologic Services Div., U. S. W. B., Wash., D. C.*), **Snow-melt degree-day ratios determined from snow-lab data.** *American Geophysical Union, Transactions*, 39(4):681–688, Aug. **1958.** 7 figs., 6 tables. **DWB, DLC**—Observations made at the Central Sierra Snow Laboratory in California and the Upper Columbia Snow Laboratory in Western Montana have been used to determine the ratio of the amount of snow melt to the accumulated number of degree days or degree hours above selected base temperatures during the late spring melting season. The use of degree days was found to give smaller errors of estimation than degree hours, and a base temperature of 32°F gave smaller errors of estimation than other bases tried. The ratio was found to be smaller for greater forest cover and to increase during the melting season. No relation was found between the ratio and average wind, humidity, or cloudiness. These, of course, have important physical effects on the heat supply to a snow cover, but variations in their effect could be obscured by the fact that they were averaged over weekly or longer periods, and some of their effect may be included in the time-of-year parameter. *Subject Heading:* **1. Snow melt-degree-day ratios.**—*Author's abstract.*

10M–524 551.579.2

Wilson, Walter T., **Empirical methods for estimating snow melting rates.** *Western Snow Conference*, 1948, *Proceedings*, pub. Feb. **1949.** p. 97–103. 3 figs., eqs. Discussion by Walter U. Garstka, p. 103–104. **DWB**—*Subject Headings:* **1. Snow melt 2. Hydrometeorology. I. Garstka, Walter U.**

Water Supply from Glaciers (551.579.3)

10M–525 551.482:551.579.3(58)

Ermilova, M., **Rozhdenie reki.** [Birth of a river.] *Vokrug Sveta*, Moscow, No. 4:17–21, April **1954.** photos. **DLC**—After depicting the majestic smooth flow of the Amu-Dar'ia, the largest river in Central Asia, which irrigates the deserts of Kara-Kum and transforms them by a network of irrigation canals and ditches into rice and cotton fields, the author describes the birth and gradual development of mountain rivers originating in firn fields and glaciers of high mountains. The process of firn and glacier melting by solar radiation, by the geothermal heat flux, rain, and the pressure of ice is explained and illustrated by a series of photographs of the Men-So glacier, the largest in the Altay Mountains. It is pointed out that the river Syr-Dar'ia is fed by more than 250 glaciers, and the Amu-Dar'ia by 356. *Subject Headings:* **1. River alimentation 2. Glacier ablation 3. Snow melt 4. Amu-Dar'ia River, U.S.S.R.**—*A.M.P.*

10M–526 551.579.3(234.3)

Ract-Madoux, M. and Reynaud, L. (*both, Service des Études E.D.F., R.E.H. Alpes II*), **L'exploration des glaciers en profondeur. Travaux de la Mer de Glace.** [Sub-surface glacier investigations: Mer de Glace.] *La Houille Blanche*, Grenoble, v. 6, Spec. No. A:299–308, May **1951.** 15 figs. In French; English summary p. 219. **DLC**—The authors report two projects aimed at hydroelectric utilization of sub-glacial water storages in which they are taking active part. Methods employed, difficulties experienced and observations made during the construction of exploration tunnels are described. Thermal and mechanical soundings, instruments used in effecting them, their technical details and operation are discussed. Photos of tunnels and of tools, cross-sections of the ice field and of sounding instruments and a runoff curve are presented. The area under prospecting is declared to be capable of yielding 200 million cu meters of water a year from a basin extending over a territory of less than 75 km². *Subject Headings:* **1. Water supply 2. Glaciology 3. Glacier runoff 4. Mer de Glace, French Alps.**—*G.T.*

RIVER HYDROLOGY (551.579.4:551.482)

10M–527 551.501.5:551.579.4:551.482(931)

*Benham, Allan D. (*New Zealand*), **Variability of flow in lake-controlled rivers of New Zealand.** *I.U.G.G. International Association of Scientific Hydrology, Brussels*, 1951, [*Transactions*], Vol. 3, pub. **1952.** p. 350–359. 6 tables, refs., eqs. **DWB**—Flow duration curves and their statistical parameters, including the geometric standard deviation, are derived for a number of lake-controlled catchment areas. Other tables give discharge for each year and its variability, characteristics of mean monthly flow and unit flood discharges. *Subject Headings:* **1. Duration curves 2. River discharge variability 3. Flood frequencies 4. New Zealand.**—*A.A.*

10M–528 551.482:551.579.4(584.6(

Berkaliev, E. T., **Osnovnye osobennosti gidrologicheskogo rezhima rek Kazakhstana i neobk khodimye usloviia dal'neishego issledovaniia.** [The main characteristics of the hydrological regim of rivers in Kazakhstan and requirement for further investigations.] *Vsesoiuznyi Gidrologicheski S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 7, issued **1959.** p. 180–184. 5 refs. **DWB** (M7 V985tr)—The water resources in Kazakhstan are rather limited (56,000 m^3 yearly per sq km) However, they are not yet exploited. The climate in inhabited parts of the region is strictly con tinental and thus the variation of annual runoff is extremely high. The necessary hydrometeoro logical and hydrological observations are not satisfactorily conducted. If water demands for in dustrial and irrigation purposes are to be met, more adequate hydrological observation service ha to be introduced. *Subject Headings:* **1. River hydrology 2. Hydrologic services 3. Kazakhstan U.S.S.R.**—*J. Nemec.*

10M–529 551.579.4:551.482:631.62

Bulavko, A. G., **O vliianii osusheniia bolot na gidrologicheskiĭ rezhim.** [The effect of swamp drainage on the hydrological regime.] *Leningrad. Gosudarstvennyĭ Gidrologicheskiĭ Institut, Trudy* No. 60:86–97, **1957.** 2 tables, 26 refs. **DWB**—The author reviews the Soviet literature on the effect of swamp drainage on the hydrological regime and finds that, as a result of insufficient ob servational data, the prevailing opinions of various investigators are intuitive, diverse and contra dictory. In general it is well established that drainage and cultivation of swamps bring about the following changes in the hydrological regime of rivers: increase in the maximum discharges of spring high water and summer-winter floods; a diminution of discharge in the presowing and sowing periods; a reduction in the discharge of the summer and winter low water. The extent of these changes differs and depends on the relationship between reclaimed area and total water catchment area. Indirect methods of solving the problem of the effect of drainage upon the hydrological regime of rivers by utilizing different data obtained by computation cannot yield reliable results. *Subject Heading:* **1. Swamp drainage effects on river discharge.**—*Author's conclusion and I.L.D.*

10M–530 551.579.4:551.482(675)

Bultot, F., **Sur le régime des rivières du bassin congolais.** [Regime of the rivers in the Congolese Basin.] *Académie Royale des Sciences Coloniales, Bulletin des Séances,* N.S., 5(2):442–456, **1959.** 1 chart, 1 plate, 3 tables, 3 refs. **DWB**—Drawing up of charts representing the mean monthly hydrometric levels for the Belgian Congo. These charts are based on mean monthly hydrometric levels at 48 stations among which 41 have made observations for more than 20 years. Study of mean yearly hydrologic regime and comments relating to the charts of mean monthly hydrometric levels. Through studying the relationships between the mean yearly hydrologic and pluviometric regimes, author situates the water cycle in the local climatic calendar. Concordance is observed between the mean yearly hydrologic and pluviometric regimes in the Kwango-Kasai, Central Hollow and North areas. Discordance between the two regimes is observed in the Lomami and Katanga districts, where they are in opposition of phases. *Subject Headings:* **1. Hydrology 2. River regime 3. Hydrometric regime 4. Belgian Congo.**—*A.V.*

10M–531 551.579.4:551.482(611)

Collet, Cl., **Les moyens mis en oeuvre en Tunisie pour l'étude des crues de la Medjerdah.** [Methods used in the study of Medjerdah floods in Tunisia.] *La Houille Blanche,* 8(3):395–408, June/July **1953.** 15 figs. French and English summaries p. 395. **DLC**—The measurement of liquid and solid discharge is explained in detail. Average discharge 29 $m^3\ 5^{-1}$ from 20,000 km^2, maximum discharge in 10 years 1200 $m^3\ 5^{-1}$. *Subject Headings:* **1. River discharges 2. Floods 3. Medjerdah River, Tunisia.**—*A.A.*

10M–532 551.579.4:551.482

Coutagne, Aimé (*Rhône, France*), **Analysis of experimental data on river hydrology: classification of hydrological studies and of the estimates derived from them.** (In: United Nations Scientific Conference on the Conservation and Utilization of Resources, Lake Success, N. Y. 1949, **Proceedings, Vol. 4, Water resources,** p. 52–55, **1951.** 12 eqs.) **DWB**—Hydrological studies are classified in accordance with time, meteorological and geographical factors. Estimates are based on: 1) probabilities and periodicities, 2) hydrometeorological correlations (snow, temperature, evapotranspiration, internal and various river correlations), 3) the consideration of locations. The article is an excellent aid for the arrangement of bibliographies. *Subject Headings:* **1. Hydrologic classification 2. Hydrometeorology 3. River hydrology.**—*A.A.*

10M–533 551.579.4:551.482:519.241.1(44)

Coutagne, Aimé, **Des covariations interfluviales.** [Interfluvial covariations.] *Société Hydrotechnique de France, Mémoires et Travaux,* 1:69–76, **1951.** figs., table, eqs. In French; English

summary p. 8. **DWB**—Regression equations and correlation coefficients for annual and monthly discharges are used in order to characterize the interfluvial covariation of some twenty pairs of French rivers. *Subject Headings:* **1. River discharges 2. Correlation coefficients 3. France.**—*A.A.*

10M–534 551.579.4:551.482.2:551.495

Darman, I., **O vliianii poĭmy na podzemnoe pitanie reki.** [The effect of a flood plain on the underground recharge of a river.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 24(51):70–88, **1951.** 6 figs., 3 tables, 10 refs., 30 eqs. **DWB**—The transformation of flood runoff into underground water in the flood plain of a river is examined theoretically on the basis of N. A. Bagrov's solution for the water exchange of river and ground waters in the river bank zone. Equations are developed for computing the water absorbed by the flood plain per unit length of river bank, the water expended in infiltration of the bottom, the expenditure for ground water during passage of a flood for a given period of time, etc. Determination of the underground recharge of the flood plain of a river by means of the method of B. I. Kudelin is described and is given by the equation $W_T = c\int_0^T I\,dt$ which, transformed into the totals of daily underground recharge and daily deviations is $c = W_T/86400\Sigma_0^T I$. The water balance of the flood plain of a river is discussed theoretically and calculations of the water balance for the Dnepr River in the stretch from Kiev-Verkhnedneprovsk and for the Volga in the stretch from Kuibyshev-Stalingrad are presented in tables and graphs. *Subject Headings:* **1. Subterranean recharge of rivers 2. River hydrology 3. Flood plains 4. Dnepr River, USSR 5. Volga River, USSR.**—*I.L.D.*

10M–535 551.482.2:551.579.4(438.1)

Debski, Kazimierz, **Alimentation souterraine de la Vistule comme fonction de retention et le bilan du circuit des eaux dans le bassin.** [Subterranean feeding of the Vistula River as a function of retention and the water balance in the basin.] *I.U.G.G. Association of Scientific Hydrology, Brussels*, 1951, [*Transactions*], 3:258–261, **1952.** fig., table. **DWB**—Data for precipitation, runoff and retention presented for each year of the period 1921–37 (Vistula River, Warsaw). Retention was computed as a power function, practically proportional to the square of discharge. Mean annual values: precipitation, 665 mm; runoff, 212 mm; evapotranspiration, 453 mm and retention, 46 mm. *Subject Headings:* **1. Hydrologic cycle 2. Ground water retention 3. Vistula River, Poland.**—*A.A.*

10M–536 551.579.4:551.482.2(058)(43–15) 551.526.8

***Deutsches Gewässerkundliches Jahrbuch: Mittelrheingebiet, 1952.** [German Hydrological Yearbook: Middle Rhine area, 1952.] Pub. Mainz, **1954.** 43 p. almost entirely tables. Issued by the German Landesamt für Gewässerkunde Rheinland-Pfalz, Mainz. This is the 8th issue of the Yearbook, the first being 1941/1945(?) and the second 1946/1947. **DWB, DLC** (GB1296.R5D38). Also: **Deutsches Gewässerkundliches Jahrbuch: Hoch- und Oberrheingebiet oberhalb des Mains—ohne Neckargebiet, 1952 (Nov. 1, 1951–Okt. 31, 1952).** [. . . High and upper Rhine, above the Mainz, excluding the Neckar area, 1952.] 65 p. almost entirely tables, map (fold. in pocket). Issued by the German Landesstelle für Gewässerkunde, Karlsruhe. Price DM 8.—from the Landesstelle. **DWB, DLC** (GB1296.R5D4). Also: **Deutsches Gewässerkundliches Jahrbuch: Niederrheingebiet unterhalb der Ahr, 1941/1945.** [. . . Lower Rhine area, below the Ahr, 1941/1945.] Pub. Düsseldorf, **1954.** 125 p. almost entirely tables. Issued by the German Ministerium für Ernährung, Landwirtschaft und Forsten des Landes Nordrhein-Westfalen. "From 1946– to be annual.— **DWB**—All three Yearbooks continue corresponding sections from the **Jahrbuch für die Gewässerkunde des Deutschen Reichs,** 1937–1940 issued by the German. Bundesanstalt für Gewässerkunde. In addition to extensive daily and monthly values of discharge and water level on the various stretches of the Rhine, and curves of duration frequency of discharge of various amounts, extreme conditions, etc., the mean water temperatures for each month are given for 2 stations on the Rhine and Mosel (Middle Rhine), and for 4 stations on the upper Rhine and Lake Constance for the years in question. *Subject Headings:* **1. River discharges 2. Water temperature data 3. Yearbooks 4. Rhine.**—*M.R.*

10M–537 551.579.4:551.482(448.1.7)

*Didier, Pierre and Guilhot, Roger, **Monographie hydrologique de l'Eyrieux: résumé de l'étude présentée à la Société Hydrotechnique de France.** [Hydrological monograph on the Eyrieux: summary of a study presented to the Hydrotechnical Society of France.] *Société Hydrotechnique de France, Paris, Mémoires et Travaux*, No. 2:115–117, **1958.** fig., 2 tables. (1958 Prix Henri Milon.) **DWB, DLC**—Summary data are presented on monthly precipitation and runoff in the Eyrieux river basin (Cevennes), showing the extreme variability of the hydrologic regime of this mountain river. Morphological, climatic and other characteristics of the basin are described. *Subject Head-*

ings: **1. River hydrology 2. Precipitation-runoff relationships 3. Eyrieux River Basin, France.** —*G.T.*

10M–538 551.509.5:551.579.4:551.482.2(282.252)

Dmitrieva, N. G., **Opredelenie zapasov vody rusle i raskhodov vody r. Amura.** [Determining river-bed water supply and water discharge of the Amur River.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 68:3–44, **1958.** 24 figs., 15 tables, 2 charts, 10 refs. **DLC**—The geologic history of the flow of the Amur River, its hydrology, the hydrography of the river and of its basin are described in detail with the aid of extensive numerical data, maps and diagrams. This is followed by an account of the method of determining the volume of water in the river channel, the velocity of the water flow and the size of the water discharge. The Amur is a rather young river although the alluvial deposits of its valley are, as a whole, very old. Pebbles and sand—the principal deposits of the valley—favor the formation of islands, division into channels, and substantially moderate the depth erosion. Below the inflow of the Sungari into the Amur, sub-channel streams, together with the water load of the Bureya, begin to play an important role. The relation between flow velocities of corresponding levels and the mean current velocity is determined by the mean number of particles (volumes) of water being displaced with the maximum and mean velocity, correspondingly. In the mountainous parts of the Amur basin the mean current velocity is about twice less than the velocity of flow; on the Khabarovsk-Komsomol'sk section they are practically equal; within the Zeya-Bureya depression the mean current velocity of the Amur is 0.7–0.8 of the flow velocity. Substantially earlier hydrometeorological forecasting for the Amur and the rivers of its basin will be possible if it should be found that underground waters exert a considerable influence upon the intensity (coefficient) of rain water runoff. *Subject Headings:* **1. River hydrology 2. River discharges 3. Amur River, U.S.S.R.**—*I.L.D.*

10M–539 551.579.4:551.482(498)

Dumitrescu, S., **Repartitia scurgerii pe sezoane la rîurile din R.P.R.** [Seasonal runoff distribution of Romanian rivers.] *Meteorologia, Hidrologia, si Gospodarirea Apelor*, Bucharest, 3(1):33–37, **1958.** 2 figs., table. Russian, French and English summaries, p. 33. **DWB**—The general laws of seasonal runoff distribution in Romanian rivers are developed. Using hydrological data from 65 stations, the author describes the regional peculiarities of the mean seasonal runoff (in rates of the total annual runoff) for each season and divides Romania into nine regions with different types of seasonal runoff distribution. *Subject Headings:* **1. Runoff variations 2. Romania.**—*Author's abstract.*

10M–540 551.579.4:551.482(282.243.1)

Eschweiler, W., **L'hydrologie du Rhin à l'aval de Bâle. (Le Rhin entre Bâle et Emmerich.)** [Hydrological features of the Rhine downstream from Basel. (The Rhine between Basel and Emmerich.)] *La Houille Blanche*, Grenoble, 14(2):125–160, March/April **1959.** 15 figs., 7 tables, 18 refs. French and English summaries. **DLC**—The upper Danube penetrates deeply into the Rhine's catchment area into which it discharges the whole of its flow during low water periods. Climatic conditions in the various parts of the Rhine basin are very different, being conditioned by the proximity or distance of the various areas to the sea or the mountains; these variations are discussed individually by the author. The slope of the rivers is steep in the upper reaches and then gradually falls off parabolically towards the river mouth, where it becomes very flat. It follows a cycle that repeats itself three times, as follows: 1. Alpine Rhine/Lake Constance; 2. Lake Constance/Bingen; 3. Bingen/river mouth. The discharge of the Rhine is very even, because of the way in which the large amounts of water supplied by the high mountains during summer are compensated by the inflow from mountains in the medium height range, which reaches a maximum in winter. The individual flood records in the present century are considered in more detail, with particular emphasis on the 1925/26 case. The river always freezes up and moves ice at the same places; i.e. at the Lorelei and at the head of the tide. The limits of the completely icebound reaches during the various winters concerned are shown on a graph. The author concludes with a description of the work carried out by the Hydrological Department and a general view of the characteristic water levels and discharges at the main level recording stations along the Rhine. *Subject Headings:* **1. Hydrology 2. Hydrography 3. Rhine River.**—*Author's abstract.*

10M–541 551.579.4:551.482:519.2

Felber, Viktor (*Hydrologist, Vienna, Austria*), **The application of the probability theory to the solution of hydrological problems.** (In: United Nations Scientific Conference on the Conservation and Utilization of Resources, Lake Success, N. Y. 1949, **Proceedings, Vol. 4, Water resources,** p. 85–90, **1951.** fig., 15 refs.) **DWB**—The probability theory is applied to the runoff problem with variable river profiles and the high water frequency problem. High water investigations led to

mixed collectives of three parts. *Subject Headings:* **1. River hydrology 2. Water level variations 3. Probability theory.**—*A.A.*

10M–542 551.579.4:551.482(282.261):627.81

Fortunatov, M. A., **Stroitel'stvo vodokhranilishcha na reke Zambezi.** [Construction of a reservoir on the Zambezi River.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia,* 91(4):358–360, July/Aug. **1959.** table, 13 refs. **DLC**—The comparative dimensions of the largest reservoirs which have been built or are under construction are presented in a table and it is seen that the Kariba reservoir, which is being built on the Zambezi river, is largest with respect to capacity but not with respect to area. The total volume up to the 484.6 meter mark is 155 km³. The reservoir is situated in the middle course of the Zambezi below the Victoria Falls; its coordinates are 16°22′ S lat and 28°38′ E long. The Zambezi River flows parallel to the boundary of North and South Rhodesia. The climate of this region is characterized by sharp alternation of dry and wet periods. The mean annual discharges into the dam are between 1200 and 1400 m³/sec. During the dry season (July–Dec.) the discharge falls to 460 m³/sec, and during the rainy season (Jan.–May) it increases to 12,000 m³/sec. The utilization of the dam for electric power production, and irrigation, the construction of the reservoir, etc. are discussed. *Subject Headings:* **1. Reservoirs 2. River hydrology 3. Zambezi River, Africa.**—*I.L.D.*

10M–543 551.579.4:551.482(436.6)

Friedrich, W. (*Wien*), **Bemerkungen über die Wasserführung der Gail (Kärnten).** [Note on the water discharge at the Gail River, (Corinthia).] *Wetter und Leben,* Vienna, 9(1/2):17–19, **1957.** tables, 2 refs. **DLC**—The Gail is the only river in Austria which shows an autumn maximum of water flow. The precipitation regime at the source of the river and the water flow are discussed and tables with monthly data on each are presented. *Subject Headings:* **1. River discharges 2. Precipitation 3. Gail River, Austria.**—*I.L.D.*

10M–544 551.579.4:551.482:517.512.2

Frolow, Vladimir, **Adresse présidentielle.** [Presidential address.] *I.U.G.G. International Association of Scientific Hydrology, Brussels,* 1951, [*Transactions*], 1:18–28, **1952.** 13 figs. **DWB**—The author presents a world-wide study on the date of maximum runoff within the year. Different methods of graphical presentation are discussed, including phase, computed by harmonic analysis, as well as secular changes and the relation of the data to climate, elevation, latitude, permeability, etc. Samples are given for the Seine, Tobol' (58°N 68°E), European U.S.S.R., Rhone, Nile, Oronte, Loire, Denmark, Scandinavia and Finland, Argentina, Yang-Tsé and Tech (Pyrenees). *Subject Headings:* **1. Maximum runoff 2. Harmonic analysis.**—*A.A.*

10M–545 551.579.4:551.482:628.11(44)

Frolow, Vladimir (*Paris, France*), **Effects of watershed management on water yields.** (In: United Nations Scientific Conference on the Conservation and Utilization of Resources, Lake Success, N. Y. 1949, **Proceedings, Vol. 4, Water resources,** p. 203–204, **1951.** 2 figs., 4 refs.) **DWB**—A short note on the estimation of the effects of basin management works, using the method of LABROUSTE. The maximum (?) annual water level of the Seine at Paris is more controlled by the mean annual temperature (evapotranspiration) than by the annual rainfall. *Subject Headings:* **1. Water level variations 2. Watershed management 3. France.**—*A.A.*

10M–546 551.579.4:551.482(497.1)

Gavrilović, Slobodan, **Klasifikacija bujičnih tokova Grdeličke Klisure i kvantitativni režim njihovih nanosa.** [Classification of flood discharges in Grdelička Klisura and quantitative regime of their deposits.] Belgrad, Gradevinska Knjiga, **1957.** 213 p. 83 figs., tables, 83 refs. English and Russian summaries p. 203–210. **DWB** (M79.4 G283kL)—The Grdelička Klisura area covers 332 sq km in the southern Morava River basin; it is characterized by an intense regime of torrential flow. This extensive study contains detailed results of precipitation and river flow measurements made in this area (1950–55), including general climatic data, data on precipitation distribution during individual rainstorms, etc. A new method of classification of flood flow (according to size of the river bed and flow intensity) is proposed and applied to the area, taking erosion conditions into account. Formulas are developed for estimating peak discharge, wash load, etc., accounting for average rainfall, number of intense rainfalls and coefficients of catchment area, soil and vegetation conditions. *Subject Headings:* **1. River discharges 2. Morava River Basin, Yugoslavia.**—*G.T.*

10M–547 551.579:551.482(52)

Japan. Ministry of Construction. River Bureau, **Rivers in Japan.** March **1954.** 54 p. 17 figs., photos, 21 tables. **DWB** (551.48 J35ri)—A brief, but comprehensive, review covering the whole gamut of problems dealing with rivers, their features, and hydrology; flood and drought

damages, their forecast and control; river utilization (irrigation, hydroelectric power and municipal water supply) and river administration. Two sections of chapters 1 and 2 (pp. 3–5 and 7–11) are devoted to meteorological and hydrological features of Japan and its rivers. They include information on climatic characteristics of the winter and rainy ("Bai-u") seasons (which differ on the Japan Sea and Pacific sides of the country), the barometric pressure and depression areas, annual precipitation amounts in various sections of Japan, the influence of typhoons (more than 700 since 1891) and snow melt upon floods whose number has rapidly increased since 1935. Numerous charts, graphs, and tables and photographs illustrate and supplement the text. *Subject Headings:* **1. River hydrology 2. Hydrology of Japan 3. Japan.**—*A.M.P.*

10M–548 551.482:551.579.4:551.482(438)

Jarocki, Walenty, **Charckterystycze stany wody i objetości przepływu rzeki Przemszy w profiilu wodowskazovym Chełmek.** [Water level characteristics of the Przemsz River at Chelmek.] *Poland. Panstwowy Instytut Hydrologiczno-Meteorologiczny, Wiadomosci Sluzby,* 1(4):309–310, **1949.** 2 figs., 3 tables. **DWB**—Contains 2 drawings: one showing discharge curves of the river drawn on the basis of 28 measurements during the period 1925–1948 giving the height of the water level as between 25 and 141 cm at the water gage, and curves showing the sums of hours of continuance of low and high water levels of the river during a rainy (1924) and a dry year (1933). *Subject Headings:* **1. Water level variations 2. River discharges 3. Przemsza River, Poland.**—*A.M.P.*

10M–549 551.579.4:551.482:551.501

Kaczmarek, Zdzislaw, **Czestotliwość przeplywów nizówkowych.** [Frequencies of minimum discharge.] *Przeglad Geofizyczny,* Warsaw, 2(4):249–261, **1957.** 3 figs., 8 tables, 8 refs., 22 eqs. English summary p. 261. **DWB, DLC**—The minimum (Q min) value of the diurnal discharge throughout the year has an asymptotic frequency distribution $F(Q \text{ min})$ dependent only on the type of the distributing function $F(Q)$. Assuming that the daily discharge distribution is limited from below, i.e. the distributing function $F(Q<E)=0$, and that the density function $Q=E$ is equal to zero, and its derivative at that point is not equal to zero, the author calculates the distribution of minimum discharges computed according to two parameters estimated from examples by the method of moments. A numerical example illustrates the application of the method. *Subject Heading:* **1. Minimum discharges.**—*A.M.P.*

10M–550 551.579.4:551.482(255)(474.5)

Khabazov, E. D., **K voprosu o vliianii na stok rek Litovskoĭ SSR stepeni zabolochennosti basseĭnov.** [Effect of the degree of swampiness of basins on river runoff in Lithuania.] *Lietuvos TSR Mokslu Akademija. Geologijos ir Geografijos Institutas, Mokslinial Pranesimai,* Vol. 3, Geofizika, Hidrologija, issued Vilna, **1956.** p. 115–118. fig., 7 refs., eqs.—The swampiness of the Lithuanian SSR is explained as a result of excessive precipitation and the presence of impermeable clay soils. The types of swamps, extent of swampiness of river basins, effect of swampiness upon the hydrological regime of rivers and the results of studies on the hydrological role of swamps carried out by comparing runoff characteristics of individual river basins of homogeneous physical geographic properties before and after drainage, and by comparing runoff modules for river basins with different degrees of swampiness, are discussed. Lack of adequate data resulted in failure to determine the effect of drainage upon swampiness. Comparison of runoff modules indicated the following: swampiness of river basins does not affect substantially their runoff, and swampiness favors the equalization of runoff during the year. The accumulating action of the swamp microrelief upon the maximum module of spring runoff can be computed by the formula of L. L. Sokolovskiĭ, $\partial = 1 - 0.60\, lg\, X(1+0.30 f_0)$, where ∂ = coefficient of lowering of maximum module of spring runoff and f_0 = area of swamp in percent of total catchment area. Also the formula of A. B. Ogievskiĭ for determining the maximum exchange of spring runoff and the formula of L. T. Fedorov for the mean module of spring runoff are given and examined critically. The negative influence of swamps upon summer low water runoff could not be confirmed. The mean values of modules of runoff during summer and fall on rivers characterized by extensive swampiness are equal, or even exceed the low water runoff of rivers with less swampiness. Also the swampiness of basins does not influence the minimum runoff of the summer low water. *Subject Headings:* **1. River basin studies 2. Runoff research 3. Bogs 4. Lithuanian S.S.R.**—*I.L.D.*

10M–551 551.579.4:551.482:551.590.21(481)

Klaeboe, H., **Fluctuations in run-off.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Oslo* 1948, [*Transactions*], Vol. 1, [pub. 1950]. p. 213–214. fig. **DWB**—Climate in Norway is getting warmer and more humid. Besides a general increase in runoff, a connection seems to exist between 5-year moving averages of runoff (Glomma River since 1850) and the sunspot curve. Increase in sunspots results in higher runoff. *Subject Headings:* **1. River discharge variations 2. Solar influences 3. Climatic variations 4. Glomma River, Norway.**—*A.A.*

10M–552 551.579.4:551.482(44)

Koch, P., **Contribution à l'étude de la corrélation entre les précipitations, les débits de sources et les niveaux de nappe dans le bassin amont de la Seine.** [A contribution to the study of the correlation between precipitation, source discharges and ground water levels in the upper Seine basin.] *Société Hydrotechnique de France, Mémoires et Travaux*, 2(2):123–130, **1955.** 3 graphs. **DWB.** Also in *La Houille Blanche*, Grenoble, v. 10, Special No. B:619–626, Sept. **1956. DLC**—The floods affecting most of the French river basins during the winter of 1954–55 led quite naturally to an attempt to correlate them with the rainfall during the periods which preceded them. An extension of this research to include ground water levels appeared to be promising, in the Seine basin in particular. Although the observations available on this subject are largely inadequate, an attempt is made in this paper to extract useful information from them. The usefulness of this information might extend beyond the scope of the recent occurrences. *Subject Headings:* **1. Precipitation-flood relationships 2. River discharges 3. Ground water-precipitation relationships 4. Seine River Basin, France.**—*Author's abstract.*

10M–553 551.579.4:551.482(764)

Lawson, Lawrence M. (*Int. Boundary & Water Comm., U. S.-Mexico*), **The Rio Grande.** *Texas Engineer*, Dallas, 22(1):8–11, Jan. **1952**;22(2):7–9, Feb. **1952. DWB**—This paper includes paragraphs on flow, artificial drainage and droughts. The hydrological facts presented are mainly centered around Elephant Butte Dam, about 125 miles upstream from El Paso. Average yearly runoff data for various periods, data on maximum floods, on the rising of underground water level caused by the artificial lake accumulated by the dam, on the desiccation of the river bed, etc., are given in rough figures. *Subject Headings:* **1. Rio Grande River 2. Dams 3. Runoff 4. Floods 5. Texas.**—*G.T.*

10M–554 551.579.4:551.482

L'vovich, M. I., **Fiziko-geograficheskie faktory rechnogo stoka.** [Physiographic factors of river flow.] (In: Vsesoiuznoe Geograficheskoe Obshchestvo SSSR, **Voprosy Geografii.** Moscow, **1956.** p. 190–198. 2 figs., 2 tables, 13 refs.) **DWB, DLC** (G58.G35). **Factorii fizico geografici ai scurgerii.** [Physiographic factors affecting runoff.] Hungarian trans. in *Meteorologia si Hidrologia*, Bucharest, 2(3):3–12, July/Sept. **1957.** 2 figs., 2 tables. **DWB**—Natural physiographic factors, such as climate, soil, vegetation, relief, are not the only factors that affect the water regime of rivers, which, according to the main sources of their alimentation and high water seasons, are classified by the author into rivers of the following zones: Polar glaciers, Arctic and Antarctic, Subarctic, Moderate, Subtropical, Tropical and Equatorial. Other very important man-made changes in the water balance of river basins and river runoff are now being achieved by hydrotechnical and land-reclamation measures, such as irrigation, non-irrigated land cultivation, forest amelioration, drying of swamps, etc. Each of these measures and their effect upon the river discharge are briefly discussed by the author. *Subject Headings:* **1. Physiographic effects on river discharge 2. River hydrology 3. Runoff.**—*A.M.P.*

10M–555 551.579.4:551.482:551.588.6

L'vovich, M. I., **O metodike otsenki izmenenii rechnogo stoka.** [Method of evaluating variations in river discharge.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geogr.*, No. 6:55–68, Nov./Dec. **1955.** 7 figs., table, 15 refs. **DLC**—The author reviews various Soviet studies on the effect of agricultural land use and forests upon river discharge. Considerable variations in river discharge are caused by agricultural land use but purely statistical studies obscure this part. *Subject Headings:* **1. River discharges 2. Forest influences.**—*I.L.D.*

10M–556 551.482:551.579.4:551.506(46)

*Masachs Alavedra, Valentin (*Prof. Lycée de Manresa*), **Le régime des rivières du Bassin du Douro.** [Regime of the rivers of the Douro Basin.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Brussels*, 1951, [*Transactions*], Vol. 3, pub. **1952.** p. 292–305 2 figs., tables, 7 refs. **DWB**—Report on hydrological data available from the basin of the Douro River. A list of stations, catchment areas and numerous annual and seasonal runoff data are presented, and the main hydrologic features are described. *Subject Headings:* **1. River hydrology 2. Hydrologic data 3. Douro River, Spain.**—*A.A.*

10M–557 551.579.4:551.482(521.77)

Matsuo, K., **Water level at the downstream of the river Kumano and precipitation.** *Journal of Meteorological Research*, Tokyo, 4(9):617–620, Feb. **1953.** 3 figs., 4 tables. In Japanese; English summary p. (38)–(39). **DWB**—The Kumano River runs through Nara Prefecture, embracing a basin area of 3,500 sq km. The basin is one of the areas with the largest rainfall amounts of Japan. The author determines a relation between the amount of rainfall at Odaigahara and water level

at Oga. Maximum rainfall at the former place is followed by maximum water level at the latter with a delay of 12 hours. *Subject Headings:* **1. Hydrologic studies 2. Kumano River, Japan.**—*From author's abstract.*

10M–558 551.579.4:551.482(438)

Mikulski, Zdzisjaw, **O monografiach hydrologicznych i ich treści.** [The hydrological monographs and their composition.] *Przeglad Geofizyczny*, Warsaw, 1(2):107–115, **1956.** 9 refs. **DLC**—A theoretical paper discussing the need of a more detailed study and description of Polish rivers and their basins. After having reviewed and criticized the existing hydrological monographs, which are mainly confined to information on the level and the discharge of rivers, the author presents his own plan for hydrological monographs which should consist of: a foreword, an introduction (general information of the basin, with map), physical and geographical properties, hydrological characteristics, a cadastral survey of water forces, water economy, bibliography, and an index of place names. *Subject Headings:* **1. River hydrology 2. Hydrology monographs 3. Poland.**—*A.M.P.*

10M–559 551.579.4:551.482:551.506.3(46)

*Munoz Oms, V. (*Empresa Nacional Hidroelectrica del Ribagorzana, Spain*), **Determination des ressources hydrauliques du Bassin Noguera Ribagorzana.** [Calculation of the hydraulic resources of the Noguera Ribagorzana Basin.] *I.U.G.G. International Association of Scientific Hydrology, Brussels*, 1951, [*Transactions*], Vol. 3, pub. **1952.** p. 284–291. charts, tables (fold.). **DWB**—Discharge data are given for each month of the period 1912/13–1950/51 at Puente Montanana and for 4 years of observation at 9 other gaging stations. The river receives a great part of its total flow from snow melt in the Pyrenees. The maximum runoff occurs in May and June, minimum in Jan. and Feb. The hydrologic year starts with Aug. *Subject Headings:* **1. River discharge data 2. Noguera Ribagorzana River, North Spain.**—*A.A.*

10M–560 551.579.4:551.482(058)(931)

*New Zealand. Soil Conservation and Rivers Control Council, **Hydrology annual and summary gauging data for New Zealand rivers to Sept. 1952.** *Its Technical Bulletin*, No. 3, May **1953.** 84 p. numerous photos, diagrs., tables. On cover title: Hydrology Annual No. 1. **DWB**—This is the first hydrologic summary for the Dominion, containing all discharge measurements made up to Sept. 1952 by any authority. Very little additional information is given. Five papers included deal with hydrometric problems. *Subject Headings:* **1. Hydrologic data 2. River hydrology 3. Yearbooks 4. New Zealand.**—*A.A.*

10M–561 551.579.4:551.482(282.243.1)

Oesterhaus, Max, **Mehrjärige (sic) periodische Schwankungen der Abflussmengen des Rheins bei Basel.** [Long year periodic oscillations of the Rhine River discharges at Basel.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Oslo 1948*, [*Transactions*], Vol. 1, [pub. **1950**]. p. 191–202. 5 figs., 8 refs., 5 eqs. **DWB**—Study based on discharge data for the period 1808–1946. Annual amounts are normally distributed and have no persistence. A series of harmonic waves, changing sometimes not only the amplitude but also phases, was computed by the method of periodogram analysis. Statistically significant periods were 5, 7, 12, 30 years. A secular wave of about 120 years was found. Dry years precede the sunspot minima by 1–4 years. Extrapolation possibilities are outlined. *Subject Headings:* **1. River discharges 2. Runoff fluctuations 3. Long period records 4. Solar influences 5. Rhine River.**—*A.A.*

10M–562 551.579.4:551.482

Pardé, M., **Etiages surabondants de certaines rivières.** [Extremely high values of minimum runoff in certain rivers.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept.* 1957, [*Transactions*], Vol. 3, pub. **1958.** p. 106–113. 14 refs. French summary, p. 106. **DWB** (M(06) 1611g)—The author has selected various areas in the United States, Canada, France and French territories, to make a comparative analysis of the minimum runoff values for various rivers. In each case the drainage system, the data thereon, and the reasons for the behaviour of the rivers are explained. *Subject Heading:* **1. Minimum discharges.**—*N.N.*

10M–563 551.482:551.579.4(281.243.3)

Pardé, M., **Quelques considérations générales sur l'hydrologie du Rhin et sur les aménagements de ce fleuve.** [Some general considerations on the hydrological aspect of the Rhine and on the improvements carried out along this river.] *La Houille Blanche*, Grenoble, 14(2):101–114, March/April **1959.** 1 chart. **DLC**—The article comprises two parts: the first treats of the hydrology of the river, the second of the improvements carried out along this river. The main hydrological characteristics of the river are given, mean abundance (mean annual uncorrected flow), specific values, and

nnual runoff balance. The seasonal variations, the regimes of the main tributaries and the changing omplex regime of the river are examined. A survey is made of standard flow and lowest water evels. Commentaries on floods give an idea of the various types of floods, their maximum power, heir evolution, speed and seasonal frequencies. Some data are given on ice and the transport of olids. The second part treats principally of hydro-electric fitting up, equipping for inland naviga- ion and flood control. *Subject Headings:* **1. Hydrology 2. Hydrography 3. Rhine River.**—*A.V.*

10M–564 551.579.4:551.482(282.24)

Pardé, Maurice, **Sur quelques rivières d'une abondance spécifique énorme.** [Some rivers with n enormous specific abundance.] (In: I.U.G.G. Association of Scientific Hydrology, **Symposia Darcy, Dijon, Sept. 1956 [Proceedings]**, Vol. 3, pub. [**1957**]. p. 184–190. French summary, . 184). **DWB** (M79 I61sym)—The specific annual abundance of the Alpestre, the Pyrenees and many other rivers whose locations are geographically similar have been studied and compared. The Alpestre and the Pyrenees drain an area of 2000 to 3500 Km² and discharge 40 to 45 lit./sec./Km². Other rivers in the area have been equally studied but the figures are a little less than the discharges of rivers bordering Norway. The present report covers details on the drainage system, the meteoro- ogical factors associated with this annual over-abundance as well as the climatological factors in the Pyrenees and other world areas such as in the states of Washington, Oregon and other Pacific sea- board areas, Chile and New Zealand. A quantitative evaluation is given with figures for each area. *Subject Headings:* **1. River discharges 2. Abnormal discharges.**—*N.N.*

10M–565 551.579.4:551.482(44)

Pardé, M. (*Prof. Ecole Nationale Supérieure d'Electrotechnique & Hydraulique de Grenoble*) and Gilbert, M. (*Dir. of Nantes & St.-Nazaire Portes*), **Régime du cours inférieur de la Loire.** [Regime of the lower Loire.] *Société Hydrotechnique de France, Mémoires et Travaux*, 1:77–84, **1951.** 3 figs. n French, English summary, p. 8.—Study based on water level measurements at Montjean. Mean annual and average monthly discharges are derived for the period 1880–1949. Estimated average discharge at the mouth is 900 $m^3 sec^{-1}$. Annual runoff is 250 mm from 750 mm precipitation; mean areal temperature probably less than 10°C. Other discussed features are runoff fluctuations, seasonal variations and floods. *Subject Headings:* **1. Runoff 2. River discharges 3. Loire River, France.**—*A.A.*

10M–566 551.579.4:551.482(438)

Pasławski, Zbigniew, **Wybitne wezbrania Warty pod Poznaniem i prawdopodobiénstwo występowanie najwższych rocznych stanow wody.** [Considerable rises of the Warta River near Poznan and the probability of appearance of the highest annual water levels.] *Przeglad Geofizyczny*, Warsaw, 1(1):5–14, **1956.** 4 figs., 3 tables, 12 refs. **DLC**—A study of important rises of Warta River water levels observed during 450 years (regular observation at the water gage station of Chwalewski Bridge started in 1822) showed that from 62 very high water level rises, about 80% took place in March–April and were caused by sudden intense snow melting. Summer high waters were caused by persistent rainfall in the upper reaches of the river. With the course of time the frequency of floods increased while their intensity diminished. This was caused, on the one hand, by the continuous destruction of forests, and by the regulation of the river bed, on the other. Graphs and tables illustrating the text are included. *Subject Headings:* **1. Water level variations 2. Floods 3. Warta River, Poland.**—*A.M.P.*

10M–567 551.588.2:551.579.4:551.482

Pechinov, D., **Po vuprosa za vliianieto na promenliviia naklon na vodnata povurkhnost vurkhu krivata vodnite kolichestva Q—f(h).** [The influence of changing slope of the water surface on the value of the water level curve Q—f(h).] *Khidrologiia i Meteorologiia*, Sofia, 1:10–16, **1957.** 4 figs., table, 2 refs., 17 eqs. **DLC**—The theory, nomograms and curves are presented for calculating the effect of the slope of the water surface in a river or body of water on the volume of flow. The curve is shown to be double, not single. The curves permit calculation of the flow from the slope of the surface depending on whether the water is rising or falling. *Subject Headings:* **1. Slope effects on river discharge 2. River hydrology.**—*Author's abstract.*

10M–568 551.579.4:551.482(234.3)

Péguy, Charles P. (*Prof. Physical Geography, Rennes Univ.*), **Morphométrie et écoulement. Recherches effectuées dans le cadre des Alpes Françaises du Sud.** [Morphometry and runoff. Studies made in the Alps of Southern France.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Brussels*, 1951, [*Transactions*], Vol. 3, pub. **1952.** p. 252–257. 4 figs. **DWB**—Author presents relative hypsometric curves for the catchment areas of the Haute Tinée and Estéron Rivers and shows that the mean runoff can be expressed as a function of the

difference between the mean height of the catchment and the main river bed (talweg). *Subj*
Headings: **1. River runoff 2. Hypsometric curves 3. French Alps.**—*A.A.*

10M–569 551.579.4:551.482(44

†Puchades, Benito, José Maria (*Barcelona Province Cartographic Service*), **El Rio Besos: estud monográfico de hidrologia fluvial.** [Besos River: monographic study of river hydrology.] *Barc lona. Instituto Geologico, Miscelánea Almera*, 7:195–354, **1948.** 7 figs., 22 photos, tables, 67 ref bibliog. p. 346–354 (119 items). **DWB**—A comprehensive account of factors affecting the hydrolog regime of the Besos River basin (N of Barcelona) such as geographical position, relief, hydrograph system, longitudinal and transverse profiles, petrography, karst phenomena, ground and artesia water, vegetation and precipitation conditions (5–10% snow), including also monthly and annu averages for irregular periods. An annual precipitation map is presented. Discharge and river loa data are summarized. The runoff coefficient varies from 0.15 to 0.34. Exceptional floods a described and the effect of human activity is analyzed. *Subject Headings:* **1. Precipitation 2. H drologic cycle 3. River hydrology 4. Besos River, Spain.**—*A.A.*

10M–570 551.579.4:551.482(66

Rodier, Jean (*France*), **Emploi systématique des bassins versants élémentaires pour les étud hydrologiques dans les territoires sous-développés.** [Systematic use of basic catchments in h drologic studies of underdeveloped regions.] *International Union of Geodesy and Geophysic Association of Scientific Hydrology, Toronto, Sept.* 1957, [*Transactions*], Vol. 3, pub. **1958.** p. 13 143. 2 figs., table. French summary, p. 133. **DWB** (M(06) 1611g)—The French have shown remarkably good effort in their systematic use of basic catchments in studying the hydrologic settin of the underdeveloped areas of Africa. One-fifth of the basins of French West Africa has bee under study. This paper contains the results of such terrain, meteorological and hydrologic investigations. *Subject Headings:* **1. River basin studies 2. Hydrologic studies 3. French We Africa.**—*N.N.*

10M–571 551.579.4:551.482(438

Senik, Stefan, **Rzut oka na stosunki odplywu w dorzeczu Przemszy.** [A glance at the runo conditions in the Przemsza river basin.] *Poland. Państwowy Instytut Hydrologiczno-Meteoro logiczny, Wiadomosci Sluzby*, 1(4):311–325, **1949.** 7 figs., tables. French summary p. 325. **DWB**— The results of a detailed investigation of hydrological conditions of the Przemsza river basin, situate in the area of the Dabrowa coal mines (Silesia) on the water divide line between Wisla and Odra where water supply is scarce and much water is used by the dense population and for industria purposes, are reported and discussed. The course and discharge of the three rivers, Brynica, Blac and White Przemsza Rivers, composing the river network are investigated and the construction of 3 reservoirs for the regulation of the discharge during the period of low waters is suggested. A map shows the river basin with annual rainfall distribution, and another map shows area covered by forests. *Subject Headings:* **1. River hydrology 2. River discharges 3. Przemsza River Basin Poland.**—*A.M.P.*

10M–572 551.579.4:551.482(438

Siebauer, Stanisław, **Characterystyczne stany wody i objetosci przeplywu rzeki Bugu do stanu koryta z roku 1936.** [Water levels and flow characteristics of the Bug River since 1936.] *Poland Panstwowy Instytut Hydrologiszno-Meteorologiczny, Wiadomosci Sluzby*, 1(4):251–252, **1949.** tables. **DWB**—Data of average lowest, mean and highest water levels (in cm) and corresponding discharge (in m^3/sec) at 12 watergage stations on the Bug River during the navigation period are tabulated. Another table shows the water level height and discharge of the river at the time of high and catastrophic high waters. *Subject Headings:* **1. Water level variations 2. River discharges 3. Floods 4. Bug River, Poland.**—*A.M.P.*

10M–573 551.579.4:551.482(438

Siebauer, Stanisław, **Charakterystyczne stany wody i objetosci przeplywu rzeki Odry.** [Water levels and flow characteristics of the Oder River.] *Poland. Panstwowy Instytut Hydrlogiczno-Meteorologiczny, Wiadomości Slúzby*, 1(4):249–250, **1949.** 3 tables. **DWB**—Contains tables showing lowest, average low, average high and highest water levels with corresponding values of water discharge as measured at 9 main water gage profiles of the Oder River for the period 1920–1936. Some data concerning the water levels and discharge during the catastrophic floods of 1854 are also given. A list of water gage stations with figures showing the distance of the stations from the river's outflow and the surface area of the basin are added. *Subject Headings:* **1. Water level variations 2. River discharges 3. Floods 4. Oder River, Poland.**—*A.M.P.*

10M–574 551.579.4:551.482(438)

Siebauer, Stanisław, **Zbiór krzywych objetości przepływu rzeki Narwi i jej dopływow prawobrzeznych Pissy, Omulwi i Orzyca.** [Discharge curves of Narew River and of its right bank affluents Pissa, Dmulwi and Orzyca.] *Poland. Państwowy Instytut Hydrologiczno-Meteorologiczny Wiadomosci Służby*, 1(4):253–275, **1949.** 17 figs. **DWB**—A series of tables and curves depicting the heights of water level and the discharge of the Narew River measured at 8 water gage stations and at 7 stations on its right bank tributaries for the period 1928–1935. *Subject Headings:* **1. Water level variations 2. River discharges 3. Narew River, Poland.**—*A.M.P.*

10M–575 551.579.4:551.482:551.326.83(80)

*Simojoki, Heikki, **On river level rising in springtime as caused by ice jams.** *Geophysica*, Helsinki, 5(1):1–10, **1952.** 4 figs., 5 tables, 5 refs. **DWB**—The relative effect of natural water rise and of ice jams on the total rise of water in the various rivers of Finland is analyzed and presented in graphs and tables. Sometimes the ice has broken up during a fall rather than a rise in the water level, and other times there has been several breakups and freezings in the late winter or spring. The average time between beginning and end of breakup, and the average amount of jamming before and after breakup is given in tables for several rivers. *Subject Headings:* **1. River ice 2. Ice jams 3. Water level variations 4. Finland.**—*M.R.*

10M–576 551.579.4:551.482(497.2)

Sueva, V., **Po vŭprosa za izchisliavane na visokite vodi ot malki vodosborni baseĭni.** [Problem of the calculation of the water level in small catchment basins.] *Khidrologiia i Meteorologiia*, Sofia, 1:57–61, **1957.** 2 figs., foot-ref. **DLC**—Discussion of various ideas presented by Soviet hydrometeorologists on the hydrology of small river basins, the length of record needed for stability of curves, variations in curves for 10 min, 20, 60, 120 min and 12 hours time intervals, and regional variations (Ukraine and Bulgaria). *Subject Headings:* **1. Hydrology of small catchments 2. River basins 3. Water level calculation 4. Ukraine 5. Bulgaria.**—*M.R.*

10M–577 551.482:551.579.4(282.243.1)

Tops, J. W.; Wemelsfelder, P. J. and Volker, A., **Le Rhin en Hollande.** [The Dutch Rhine.] *La Houille Blanche*, Grenoble, 14(2):249–269, March/April **1959.** 16 figs., 4 tables, 6 refs. French and English summaries. **DLC**—In view of the fact that the Netherlands is a country in which the average height of the land is lower than anywhere else in the world and there is a constant threat from the sea, the appearance of the Dutch Rhine is very different from that of the sections upstream of the Netherlands border. The authors discuss the three factors that affect the country most vitally, which are the constant fight against flooding when the river is in spate, improving the river's navigability, and the use of water from the Rhine to meet the demand for fresh water. It is an interesting fact that three requirements made themselves felt successively down the centuries, so that the necessity of keeping the Rhine in check is more urgent now than ever before. Originally, the chief concern was to provide some form of flood protection, but with the development of navigation, means had to be found to keep a clear passage open for river craft. More extensive river regulation works were required, which led to the canalization of one of the arms of the river. Finally, from the turn of the present century onwards, the Rhine became more and more important as a general source of water for the country, supplying the water required to push back sea water as well as additional irrigation and drinking water. *Subject Headings:* **1. Hydrography 2. Hydrology 3. Dutch Rhine.**—*Authors' abstract.*

10M–578 551.579.4:551.482(437)

***Vodní stavy a odtoky nařekách v Cechách a na Moravě v odtokovem roce . . . Wasserstände und Abflüsse an den Flüssen. . . .** [River stages and runoff in Bohemia and Moravia in the water year. . . .] Issues seen include vol. 130 and 132, pub. **1940**; Vol. 136, pub. **1941**; Vol. 142, pub. **1942**, Vol. 144 (for 1940), pub. **1942.** This is *Vodopis Československé Republiky, Prague, Ser.* 3. Title of main series varies: *Vodopis Čech a Moravy.* **DLC** (GB726.C9V62)—The publication contains results of water level and runoff measurements of Bohemian and Moravian rivers for the water year 1940 (Dec. 1, 1939 to Nov. 30, 1940). It includes a list of 269 river gage stations (with characteristics), distributed according to river basins and 5 tables of measurement data. Table 1 (IIIa) p. 10–22 presents average monthly and yearly data of water levels, highest and lowest water stands and characteristic peak levels of 209 stations. Table 2 (IIIb) average monthly and yearly discharge amounts, max. and min. discharges, annual amounts of precipitation and runoff. Table 3 (IVa) water level heights which were exceeded during a certain period of the year in per cent. Table 4 (IVb) discharge amounts—exceeded during a certain period of the year in per cent, and Table 5 (V) results of discharge measurements (554 measurements showing the dates of measurements, the water level in cm and discharge in m^3/sec. *Subject Headings:* **1. River discharges 2. Runoff data**

3. Water level variations 4. Czechoslovakia. I. Czechoslovakia. Státní Ústav Hydrologicky Hydrotechnicky.—*A.M.P.*

10M–579 551.482:551.579.4(282.243

Walser, E., **Le bassin du Rhin à l'amont de Bâle et l'influence des lacs sur le régime du fleu** [The catchment area of the Rhine above Basel and the influence of lakes on the river's regim *La Houille Blanche*, Grenoble, 14(2):115–124, March/April **1959.** 10 figs., 12 refs. French a English summaries. **DLC**—The characteristics of the Rhine upstream of Basel are summariz and compared with the characteristics of the complete Rhine Basin and are partially compared w the characteristics of the Rhine Basin downstream of Basel. Configurations and topography a dealt with first of all, then flow and how it varies with time. Glaciers and lakes characterize t upper basin but are not encountered in the lower basin. The runoff coefficient is given and it shown that it varies with altitude. The flow regimen at Basel is alpine and is discussed toget with the factors that condition it. After a short discussion of winter floods, the purely alpine natu of the regimens of the glacial tributaries is brought out. The next point to be discussed is the fluence of the lakes on the flow regimen at Basel. This effect is not only seasonal but it also regulat flooding and the transport of solid materials. Large scale training work during the 18th and 19 centuries appreciably increased the flow-smoothing effect of the lakes. *Subject Headings:* **1. H drology 2. Hydrography 3. River regime 4. Influence of lakes 5. Runoff 6. Rhine.**—*Autho abstract.*

10M–580 551.582(644) 551.526.8 551.579:551.482(64

Watts, J. C. D., **The hydrology of a tropical West African estuary.** *Institut Français d'Afriq Noire, Dakar Bulletin, Ser. A*, 20(3):697–750, July **1958.** 18 figs., 26 tables, 24 refs. Summa p. 749–750. **DLC, DWB**—Daily meteorological observations were made over a period of 3 yea concurrently with observations on temperature and salinity in the Rokel River Estuary (Sier Leone River). The main features of the climate are discussed and data given for the princip climatic elements. The seasonal variations in temperature and salinity are shown to be close related to those of wind and rainfall. Annual variations in the direction of the coastal current associated with the seasonal changes in wind, are considered to be responsible for changes in temper ture and salinity conditions, especially in the dry season. Salinity observations were made at hig and low-water during springs (May–April, 1953/1954) and neaps (July–June, 1954/1955) at stations situated in mid-channel. The effect of fresh water flow from the upper river is very marke causing a large dilution of the surface waters for a considerable distance down the estuary. Asso ated with the fresh water flooding of the estuary there is a considerable eddying of the tidal strea Data are given for the concentrations of H-ion, excess base, phosphate, nitrate, nitrite, ammon and dissolved oxygen in the estuarian waters; the weight of suspended material in the water is al indicated. *Subject Headings:* **1. River temperatures 2. Estuarian hydrology 3. Climatic influence 4. Chemistry of river water 5. Rokel River Estuary (West Africa).**—*From author's abstract.*

Methods of Calculation (551.579.4:551.482:551.501)

10M–581 551.579.4:551.482:519.2

Alekseev, G. A., **K voprosu ob otsenke veroiatnoĭ povtoriaemosti gidrologicheskikh velichi** [Estimation of the probable frequency of hydrological values.] *Meteorologiia i Gidrologiia*, Leni grad, No. 3:46–48, March **1958.** 2 refs., 11 eqs. **DWB, DLC**—The author examines the validit of the formula of S. N. Kritskiĭ and M. F. Menkel' $p = m/n + 1$ for calculating the empirical proba bility of the terms of a statistical series $Q_1 \cdots Q_m \cdots Q_n$, arranged in decreasing order, as if it expresse the mathematical expectation of the number of annual excess of discharge Q_m as in several series (N in a given region. It is shown mathematically that this formula expresses the mathematical expecta tion only in the rare instance when the maximum discharges for adjoining rivers represent independen magnitudes. Such conditions may exist only during the formation of maximum shower discharges i arid steppe regions resulting from local thunderstorms. On the other hand it is shown that th formula of N. N. Chegodaev $p = m - 0.3/n + 0.4$, which expresses the median magnitude amon maximum discharges, observed for one and the same N year period on a number of rivers in a give region, is superior to the above formula. *Subject Headings:* **1. Statistical methods in hydrolog 2. River discharge calculations.**—*I.L.D.*

10M–582 551.501:551.579.4:551.48

Berg, E. V., **Ekstrapoliatsiia i priblizhennoe postroenie krivoĭ raskhodov vody.** [Extrapolatio and approximate construction of rating curves]. *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (of 3r Conference, Oct. 1957), Vol. 8, issued **1959.** p. 87–93. table, 48 refs. **DWB** (M79 V985tr)— Extrapolation of rating curves for river discharges based on the Chezy formula is not exact.

itical review of other methods for construction of rating curves with a limited number of direct scharge gaging is given. The method of KRITSKIY-MENKEL, based on auxiliary function $H) = \sqrt{T}/n$ (H = water stage, T = hydraulic energy gradient, n = coefficient of roughness) is recommended. *Subject Headings:* **1. River discharge calculations 2. River hydrology.**—*J. Nemec.*

10M–583 551.501:551.579.4:551.482(497.1)

Cerniševski, D., **Proračun protoka i oticanja u vodotočima.** [Calculation of river runoff.] *Yugoslavia. Hidrometeoroloska Služba, Hidrometeoroloski Glasnik*, 2(1/2):56–67, **1949.** 3 figs., tables, 3 refs., 8 eqs. In Serbian. **DWB**—On the basis of long period observations made in the basins of the Morava, Drava and other rivers, an analysis of hydrologic calculations and their accuracy is given. The author paid special attention to the method presented by the American hydrologist FOSTER. *Subject Headings:* **1. Runoff 2. River basins 3. Hydrologic calculations 4. Yugoslavia. I. Foster, Margaret D.**—*N. T. Zikeev.*

10M–584 551.501:551.579.4:551.482

Dębski, Kazimierz, **Metodă empirică pentru calculul debitelor maxime probabile.** [An empirical method for the computation of probable maximum discharge.] *Meteorologiia, Hidrologiia si Gospodărirea Apelor*, Bucharest, 3(4):18–23, **1958.** fig., table, 4 refs., 15 eqs. Russian summary, p. 75, French summary, p. 77 and English summary, p. 79. **DWB.** Also as: **Méthode empirique d'évaluation des débits des crues probables,** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957,* [*Transactions*], Vol. 3, publ. **1958.** p. 322–330. fig., table, 6 refs., 15 eqs. **DWB** (M(06) I611g)—The author tries to determine the value of discharges with various probabilities of repetition in the case sufficient data are not available; he starts from an approximate relation based on the flow duration curve. Several possible cases are studied indicating solutions for these cases and giving examples from the territory of the Polish People's Republic. *Subject Headings:* **1. Maximum river discharge calculation 2. Flow duration curves 3. Poland.**—*Author's abstract.*

10M–585 551.501:551.579.4:551.482

Dmitrieva, N. G., **Opredelenie krivykh raskhodov vody po dannym ob urovniakh i sloe stoka.** [Determination of water discharge curves on the basis of data of levels and runoff.] *Meteorologiia i Gidrologiia*, Moscow, No. 3:36–40, May/June **1955.** 2 figs., table, eqs. **DWB**—The method of determining the coordinates of discharge curves is based upon finding a relationship between the discharges (Q) and water levels (H) over an extended time interval in the absence of direct measurement of flow between two aligned points. The problem is solved simply when the relationship $H = f(Q)$ is linear and the volume of flow through a given linear distance for any time interval can be determined by the flow of other rivers. The equations for determining Q are presented and the method is applied to determine water discharges at a number of points in the Don River. *Subject Headings:* **1. River discharges 2. River discharge calculations.**—*I.L.D.*

10M–586 551.501:551.579.4:551.482

Fedorov, V. V., **Nekotorye zakonomernosti sezonnogo izmeneniia dna sudokhodnykh rek i ustoĭchivost' krivykh raskhodov vody.** [Certain regularities in the seasonal changes of the bottom of navigable rivers and the stability of water discharge curves.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 8, issued **1959.** p. 93–100. 4 figs., table. **DWB** (M79 V985tr)—The instability of river channels causes difficulties in using rating curves for the computation of discharge. The influence of seasonal changes in a channel (mainly after spring floods) can be partly eliminated by correlation between a discharge of a known stage, on one side, and maximum spring flood discharge and the gradient of its decrease ΔQ, on the other. Such correlations were made for the Dnieper, Irtish, Kama and Don Rivers. The method can also be used to forecast a rating curve for minimum summer discharges. *Subject Headings:* **1. River discharge calculations 2. River discharge forecasting 3. USSR.**—*J. Němec.*

10M–587 551.579.4:551.482:551.501

Kalinin, G. P. and Miliukov, P. I., **O raschete neustanovivshegosia dvizheniia vody po ruslam pri pomoshchi krivykh dobeganiia.** [Computation of irregular movement of water along river beds, using the unit-graph method.] *Meteorologiia i Gidrologiia*, Leningrad, No. 7:18–25, July **1958.** 2 figs., table, 8 refs., 24 eqs. **DWB, DLC**—The authors attempt to derive unit graph curves on the basis of the theory of irregular movement of water in channels. A simplified method for computing irregular movement of water is developed. It is based upon the fact that each channel can be considered as consisting of a series of sections for each of which there exists a simple relationship between the volume of water in a characteristic section and the discharge at its lower end, $Q = f(W)$; where Q = discharge of water; W = volume of water. On the assumption that the relationship is

linear, namely $Q=(1/\tau)W$ and that τ is the constant parameter for all characteristic sections, t authors analyze the movement of an elementary volume of water (ω) along a river channel consisti of n characteristic sections and derive a formula for determining the elementary discharge at t nth characteristic section of time t, counting t from the end of the interval Δt (initial interval time), namely

$$Q_{En}=q(1-e^{-(\Delta t/\tau)})\frac{e^{-(t/\tau)}}{(n-1)!}\left(\frac{t}{\tau}\right)^{n-1}$$

The computation formula for the elementary discharge is derived

$$Q_{E,n}=\frac{q\,\Delta t}{\tau}\frac{e^{-(m\Delta t/\tau)}}{\tau(n-1)!}\left(m\frac{\Delta t}{\tau}\right)^{n-1}$$

where m = ordinal number of computational time interval. By dividing both sides of the equati by q the ordinate of the unit hydrograph curve is obtained, namely

$$P_n=\frac{\Delta t}{\tau}\frac{e^{-(m\Delta t/\tau)}}{\tau(n-1)!}\left(m\frac{\Delta t}{\tau}\right)^{n-1}$$

Formulas for determining the value of the zero ordinate of the unit hydrograph curve for one, tw and three characteristic sections are derived; for the last this formula is

$$P_{3,0}=1+\left(2+\frac{\Delta t}{2\tau}\right)e^{-(\Delta t/\tau)}-\frac{3\tau}{\Delta t}(1-e^{-(\Delta t/\tau)})$$

A series of examples of the transformation of flood waves and of discharges of the Ivanov Sta Hydroelectric Station are presented. *Subject Headings:* **1. River discharge calculations 2. U.S.S.I** —*I.L.D.*

10M–588 551.501.4:551.579.4:551.482:51

Kurdov, A. G., **O formulakh dlia rascheta minimal'nogo stoka.** [Formulas for computir minimum runoff.] *Meteorologiia i Gidrologiia*, Leningrad, No. 4:36–38, April **1958.** 7 refs., 3 eq **DWB, DLC**—In the absence of observations on minimum flow of rivers the latter is computed fc the European part of the USSR by the following formulas of N. D. ANTONOV: for summer minimum without taking into account lakes,

$$M_s=0.53M_0^{1.3}F^{0.035}-f_sM_0^{1.3}$$

for winter minimum

$$M_w=0.63M_0^{0.82}F^{0.035}-f_wM_0^{0.82}$$

and average monthly minimum

$$M_a=0.63M_0^{0.82}F^{0.035}-f_aM_0^{0.82}$$

M_0 = module of mean annual flow, F = area of catchment basin, and f_s, f_w, f_a parameters represente as isolines. The second term of the equations characterizes water losses during winter by ice forma tion and during summer by evaporation. The explanation of the presence of the module of mea annual flow in the positive power in the second as well as in the first term is a matter of importance As a result a study of small rivers it was found that the relationship between M_r modules of loss and M_0 module of mean annual flow is not directly proportional as the formulas of ANTONOV indicate Instead, there is an increased relationship between M_r and M_0. The second term is numerically disproportionately large as a result of the presence of the term M_0. It is concluded that this secon term of ANTONOV's empirical formulas does not have a definite physical meaning since the loss o water during flow formation has no direct relationship with M_0 but rather has a slight inverse rela tionship or at best no relationship at all. *Subject Headings:* **1. Minimum river discharge calculation 2. River discharge formulas.**—*I.L.D.*

10M–589 551.501.4:551.579.4:551.482(498)

Platagea, Gh., **O metodă de interpolare approximativă în calculul debitelor maxime.** [A metho of approximate interpolation for computing maximum flood discharge.] *Meteorologiia, Hidrologi si Gospodărirea Apelor*, Bucharest, 3(4):23–24, **1958.** 2 figs., eq. Russian summary, p. 75, Frenc summary p. 77 and English summary, p. 79. **DWB**—The paper deals with the problem of deter mining maximum flood discharge of the rivers situated in the "Banat" (Southwestern part o Romania) and of the "Jijia" and "Bahlui" rivers (tributaries of the Prut river). Based on the floo

ischarges measured of the above mentioned rivers, the following relations have been established: $q_{max}=f\left(\frac{1}{L}\cdot\sqrt{\frac{i}{s(p+1)}}\right)$ where q_{max} is the specific maximum flood discharge ($1/S$, km²); L = the ength of the main river (km); i = the mean slope of the hillside; p = the rate between the forested urface and the surface of the basin; s = the surface of the catchment area. *Subject Headings:* **. Maximum flush discharge calculations 2. Romania.**—*Author's abstract.*

10M–590 627.13:551.326.83 551.579.4:551.482

Solomon, S. and Sclifos, F., **Contributie la problema calculului debitelor de iarnă în periodadele u de gheaţă.** [Calculating winter flow for periods of ice cover.] *Meteorologia şi Hidrologia*, Bucharest, 2(3):62–73, July/Sept. **1957.** 3 figs., 4 tables, 18 eqs. **DWB**—The use of F. I. Bydin's ormula for calculating river flow under an ice cover (considering temperature, ice cover charac- eristics, cross section of the river bed, etc.) is explained. The various parameters involved in the ormula are tabulated for several rivers in Romania for the winter 1953/54. *Subject Headings:* **1. Stream flow calculation 2. Ice cover effects.**—*G.T*

10M–591 551.579.4:551:482:551 501

Trestman, A. G., **Nekotorye voprosy postroeniia krivykh raskhodov vody i vychisleniia stoka pri neustoĭchivoĭ sviazi mezhdu raskhodom i urovnem.** [Some problems in the construction of curves or water discharge and computation of discharge in the case of an unstable relation between flow and water level.] *Meteorologiia i Gidrologiia*, No. 10:45–48, Oct. **1956.** 3 figs. **DWB, DLC**—Several examples illustrating the deviation of measured discharges of water from the discharge curve are presented. It is shown that in order to obtain the true form of water discharge curves it is necessary to take into account factors prevailing over a given stretch of the river not only at the measuring point but also at a distance below or above it. Additional observations on the regime of a river must be made especially in small mountain rivers. *Subject Heading:* **1. River discharge computation.** —*I.L.D.*

10M–592 551.579.4:551.482:551.501

Yevdjevic, V. M. (*Belgrade, Yugoslavia*), **Un procédé d'extrapolation des courbes de débit pour les hautes eaux.** [A method of extrapolating discharge curves for high waters.] (In: I.U.G.G. Association of Scientific Hydrology, **Symposia Darcy, Dijon, Sept. 1956 [Transactions]**, Vol. 3. pub. [**1957?**]. p. 300–302. 2 figs. **DWB** (M79 I61sym)—A new procedure for the extrapolation of the river discharge curves is given. It is based on the application of Galton's law for the flow duration curves, their extrapolation being made in the diagrams with scales logarithms-probability. From that extrapolation the discharges per second for the given flood levels from the water level duration curves and from the extrapolated duration curves are obtained, and thus the discharge curve is also extrapolated. *Subject Headings:* **1. River discharge calculations 2. Extrapolation formulas.**—*Author's abstract.*

10M–593 551.501:551.579.4 551.482

Zheleznıakov, G. V., **Gidravliko-gidrometricheskiĭ sposob opredeleniia raskhodov vody v otkrytykh ruslakh.** [Hydraulic-hydrometric method of determining water discharge in open streams.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 8, issued **1959.** p. 54–65. 4 figs., 4 tables, 10 refs., 26 eqs. **DWB** (M79 V985tr)—On the basis of theoretical considerations on the distribution of velocities in a vertical column of water, a new formula for computating discharge from surface velocities is derived. Its simplified form is:

$$Q=1.5Q\Phi-0.5v_{max}\cdot w, \qquad \text{where}$$

Q = discharge; $Q\Phi$ = approximate discharge, calculated from surface velocities; v_{max} = maximum surface velocity, w = cross section of flow. The formula has been tested on 30 rivers in USSR. *Subject Heading:* **1. River discharge calculations.**—*J. Němec.*

Methods of Measurement (551.579.4:551.482:551.501)

10M–594 551.501:551.579.4:551.482(47)

Belykh, F. I., **Uchet zaregulirovannogo stoka na verkhne-volzhskikh gidroelektrostantsiiakh na primere Rybinskoĭ GES.** [Calculation of regulated discharge at hydroelectric power plants of the upper Volga River as exemplified by the Rybinsk hydroelectric power plant.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 8, issued **1959.** p. 114–118. 2 tables. **DWB** (M79 V985tr)—At the Rybinsk hydroelectric power station, discharge through the turbines was directly measured in the channel below the station and compared with calculated turbine dis-

charges, showing very good agreement, which proves the possibility of gaging discharge at hydr electric power stations. *Subject Headings:* **1. River discharge calculations 2. River dischar measurement techniques 3. Hydroelectric power stations 4. U.S.S.R.**—*J. Němec.*

10M–595 551.501:551.579.4:551.4

Gavrilov, A. M. and Proskuriakov, A. K., **Organizatsiia i provedenie ucheta stoka vody gidroelektrostantsiiakh.** [Organization and conduct of accounts of water discharge at hydroelectr power plants.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. issued **1959.** 2 figs., 12 refs. **DWB** (M79 V985tr)—To get right discharge gaging on rivers on whi hydroelectric power stations are built, the installations of the power station should serve as dischar measuring devices. Turbines can be used for the purpose, however special discharge meters a better. All turbines should be experimentally calibrated and a net of such gaging stations establishe Example of Rybinsk, Volkhov and Svirskoye power stations is given. Small turbines should calibrated under normal load and not under reostat load. More specialists should be trained f this work. *Subject Headings:* **1. Hydrologic stations 2. River discharge measurement techniqu 3. U.S.S.R.**—*J. Němec.*

10M–596 551.501:551.579.4:551.48

Koplan-Diks, S. I., **O metodike gidrologicheskikh nabliudeniĭ na stantsiiakh i postakh Gidr metsluzhby SSSR.** [Hydrological observation methods at stations and posts of the Hydrometeor logical Service of the USSR.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (of 3rd Conference, Oc 1957), Vol. 8, issued **1959.** p. 30–38. 3 figs. **DWB** (M79 V985tr)—Three main methods of di charge measurement with current meters are discussed: 1) the complete one—detailed vertical ar 5–6 point measurements, 2) basic one, using only 2–3 point measurements, a small number of vertical 3) reduced one, using only a few verticals (3.2 or even 1). Experiments show that if in the secon method velocities are measured at 0.15, 0.5 and 0.85 of the depth, results are almost as good as wit the complete method (in 85% of cases, there are no greater differences than 3%). Method 3 is goo for nonstationary flow, being very fast. Methods of interpolating daily flow from discontinue gaging, measurement of low velocities and discharge gaging in the vicinity of hydroelectric pow stations are also discussed. *Subject Headings:* **1. River discharge measurement technique 2. U.S.S.R.**—*J. Němec.*

10M–597 551.501:551.579.4:551.48

Pikush, N. V., **Nekotorye voprosy gidrometrii zaregulirovannykh rek.** [Certain problems the hydrometry of regulated rivers.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (of 3rd Conferenc Oct. 1957), Vol. 8, issued **1959.** p. 130–135. 11 refs. **DWB** (M79 V985tr)—The author criticize present practices of discharge measurement at hydroelectric power stations and recommends a wid use of mixing (electrolythical) method, construction of new stage measuring instruments whic would permit an accuracy of microns and special velocity meters for measuring where ordinary curren meters are not usable. Stresses also necessity of more attention to regulated rivers. *Subjec Headings:* **1. River discharge measurement techniques 2. Hydrometry 3. U.S.S.R.**—*J. Němec.*

10M–598 551.501:551.579.4:551.48

Seredenko, P. Ia., **O raskhozhdeniiakh stoka vody mezhdu stvorami rezhimnykh vodpostov gidroekektrostantsiĭ.** [Discrepancies between water discharge at gage stations and hydroelectri power plants.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 8 issued **1959.** p. 135–140. 2 figs., 2 tables, 2 eqs. **DWB** (M79 V985tr)—If discharge on smalle rivers under a peak hydroelectric power station is measured once or twice a day only, many mistakes in evaluation of total runoff and consequently of efficacy of the station, can be committed 31 cases have been examined. Conclusions show that the power production regime (peak hours has to be considered when organizing discharge gaging under the power plant. Automatic stag recorders are recommended. *Subject Headings:* **1. Hydrologic stations 2. River discharge measure ment techniques 3. U.S.S.R.**—*J. Němec.*

10M–599 551.501:551.579.4:551.48

Vid, V. E., **Fotograficheskiĭ metod opredeleniia raskhodov vody v otkrytykh potokakh.** [Photo graphic method of determining water discharge in open streams.] *Vsesoiuznyĭ Gidrologicheski S"ezd, Trudy* (of 3rd Conference, Oct. 1957), Vol. 8, issued **1959.** p. 66–74. 3 figs., 2 tables, 9 eqs **DWB** (M79 V985tr)—The principle of discharging indicator floaters from the bottom of the channe in the gaging cross section and photographing their appearance on surface of water is used to comput the discharge. Bubbles of air or gasoline are used as indicator floaters. Experiments show that if th diameter of a bubble is over 35 mm, the velocity of lift can be considered as constant and the integra tion of velocity of water on the vertical as sufficiently exact. The description of the instrument

nd theoretical as well as practical computations are given. The method is good for narrower, eep, calm water, mainly irrigation canals. *Subject Heading:* **1. River discharge measurement echniques.**—*J. Němec.*

FLOODS

General (551.579.4)

10M–600 551.579.4(439.1)

Babos, Zoltan, **A Szekszardi-Séd nagyvizei.** [The flood discharge of the Szekszard-Sed.] *Vizügyi Közlemények*, Budapest, No. 3:334–339, **1958.** 2 figs., 5 refs. French and German summaries (summary section) p. 59.—A specific discharge of 12–13 $m^3/s\ km^2$ measured in the Szekszárd Séd River has been mentioned as a record value for Hungary. The author shows that this amount should be reduced by at least 20% on account of the suspended matter carried by the flood waters. Data on rainfall intensity and flood probabilities are presented for Szekszárd. *Subject Headings:* **1. Flood intensities 2. Szekszard-Séd River, Hungary.**—*G.T.*

10M–601 551.579.4:631.43(71)

Baracos, A., **Foundation investigation in Winnipeg following the 1950 Red River flood.** *Canadian Soil Mechanics Conference, 5th, Ottawa, Jan. 10–11, 1952, Proceedings*, p. 56–58. **DWB**—Results of an investigation on post-flood changes in physical properties of soils, conducted at Winnipeg during 15 months following a Red River flood in April 1950, are summed up. It was found that decrease in soil moisture was rapid in sand and silt and much slower in clay. *Subject Headings:* **1. Floods 2. Soil moisture 3. Winnipeg, Canada.**—*G.T.*

10M–602 551.579.4

Benson, Manuel A. (*U. S. Geological Survey, Washington, D. C.*), **Streamflow and flood-frequency studies.** *Science*, Wash., D. C., 119(3098):694, May 14, **1954.** **DWB**—Describes studies (on state-wide basis) under way by engineers and hydrologists of U. S. Geological Survey. Eventual coverage of all of U. S. is contemplated. *Subject Headings:* **1. Flood frequency studies 2. U. S. Geological Survey.**—*M.R.*

10M–603 551.579.4:551.553.21(54)

Bose, U. K., **Preliminary meteorological study associated with West Bengal rivers.** *Indian Journal of Power and River Valley Development*, Calcutta, 7(9):9–12, Sept. **1957.** 5 figs., 4 tables, 5 refs. **DLC**—Rainfall data for West Bengal are analyzed for 47 monsoon storm periods of 7 days' duration each (1933–1954). Floods are found to occur more often when maximum storm rainfall occurs in Sub-Himalayan West Bengal rather than in central and southern West Bengal. *Subject Headings:* **1. Flood-rainfall data analysis 2. Monsoon rains 3. Monsoon floods 4. West Bengal, India.**—*G.T.*

10M–604 551.579.4:551.553.21(541.2)

Das, A., **Problem of West Bengal Rivers with particular reference to rainfall in their catchments during south-west monsoon and associated run-off.** *Indian Journal of Power and River Valley Development*, Calcutta, 7(9):13–18, Sept. **1957.** 5 figs., tables. **DLC**—Monsoon precipitation over Bengal is described in terms of the interplay of the western and southeasterly branches of the monsoon, the orographic effect of the Himalayan ranges, and the influence of depressions in the north Bay of Bengal. The impact of monsoon precipitation and resulting flood runoff upon water utilization in Bengal is discussed. *Subject Headings:* **1. Monsoon rains 2. Monsoon floods 3. West Bengal.**—*G.T.*

10M–605 551.579.4(438)

Dębski, Kazimierz, **Wielkie wody rzeki Biebrzy.** [The floods on the Biebrza River.] *Poland. Panstwowy Instytut Hydrologiczno-Meteorologiczny, Wiadomosci Sluzby*, 1(4):285–294, **1949.** 3 figs., tables. French summary p. 294. **DWB**—On the basis of water level observations of the Biebrza River, a tributary of the Narew River, made during the period 1931–1937 and complemented by measurements at Pultusk on the Narew in 1921 to 1937, it has been established that the highest known discharge of 461 m^3/s. took place on March 21, 1933 at the station at Burzym. *Subject Headings:* **1. Floods 2. Biebrza River, Poland.**—*A.M.P.*

10M–606 551.579.4(540)

*Handa, C. L. and Sehgal, S. R. (*both Irrigation Res. Inst., Punjab, Amritsar, India*), **On hydrology of floods in Punjab, India.** *I.U.G.G. Association of Scientific Hydrology, Brussels, 1951,* [*Transactions*], Vol. 4, pub. **1952.** p. 105–122. 6 tables, 3 figs., 2 maps. **DWB**—An extensive list

gives rainfall and discharges for a great number of recorded floods. Flood probability curves a derived. Winter discharges and rainfall show practically no trend. *Subject Headings:* **1. Floo 2. Flood probability 3. Punjab India.**—*A.A.*

10M–607 551.579.4(434

Hebner, E. and Trenkle, H., **Hochwasser in Baden in Jahre 1935.** [Flood in Baden in 1935 *Baden. Landeswetterdienst, Jahresbericht mit Abhandlungen,* **1951/1952.** p. 93–119. 7 figs 8 tables. **DWB**—An elaborate hydrometeorological study of a series of floods, caused by excessi rains. Synoptic situations are described and a list of observed maximum discharges is given. series of maps shows the distribution of rainfall, preceding the floods. Sample hydrographs observ in 1935, are given for two rivers. There is no attempt to make a rational analysis or to apply t method of unit hydrographs. *Subject Headings:* **1. Floods 2. Excessive rainfall 3. Bade Germany.**—*A.A.*

10M–608 551.579.4(439.

*Karkus, Pál, **Néhány vízfolyásunk különböző valószinűségű árvizi hozamai.** [Flood flows different probability on some Hungarian rivers.] *Vízügyi Közlemények,* Budapest, No. 1:158–16 **1953.** 3 figs., refs. Russian and German summaries p. (20). **DWB**—Curves representing perio of probable occurrence of various flood levels are presented for the Hungarian rivers Danube, Tisz Rába, Sajó and Hernád. The values were calculated from river stage records varying in leng between 49 and 87 years. In the case of the Danube distinction is made between floods caus by rainfall and those caused by snow melt. *Subject Headings:* **1. Flood frequencies 2. Hungar** —*G.T.*

10M–609 551.579.4:551.58

Kazantsev, B. P., **Makroprotsessy formirovaniia polovodiĭ v basseĭnakh znachitel'nykh razmero** [Macroprocesses of flood formation in large [river] basins.] *Moscow. Tsentral'nyi Instit Prognozov, Trudy,* 2(29):3–33, **1947.** 25 figs., 4 tables, 3 refs., 7 eqs. **DLC**—Proceeding from M. A Velikanov's concept of the influence of areas of simultaneous snow melting on the formation spring high waters, the author introduces the theory and a practical method of investigating macr processes of flood formation caused by snow melt, i.e. the dynamics of such areas, the intensity of th melting and the influence of the relief determining the duration of the runoff, for the purpose precalculating the hydrograph of spring floods in large size river basins where the melting does no proceed simultaneously. The method was successfully applied in investigations of spring high wate in two basins (Oka-Murom and Oka-Gorbatov) between 1931 and 1941. Numerous graphs, curve tables and a comparison of precalculated and factual hydrographs are included. *Subject Heading* **1. Spring floods 2. Snow melt foods 3. Flood hydrographs 4. Macroclimatic influences 5. Ok River Basin, U.S.S.R.**—*A.M.P.*

10M–610 551.579.4(481

Klaeboe, H. (*Norway*), **Movement of flood-waves.** *I.U.G.G. Association of Scientific Hydrolog Brussels, 1951,* [*Transactions*], Vol. 4, pub. **1952.** p. 58–60. 5 graphs. **DWB**—Discussion of great flood in the Otta-Lågen River, which flows through a number of lakes, including Lake Mjö the greatest of Norway. This lake delayed the flood by 5 days and reduced it to ⅓ of the origina magnitude. Characteristic hydrographs are shown. *Subject Headings:* **1. Floods 2. Flood wave 3. Otta-Lågen River, Norway 4. Mjös Lake, Norway.**—*A.A.*

10M–611 551.579.

Kuznetsov, I. A., **Pavodki i navodneniia.** [High water and floods.] *Priroda,* Moscow No. 5:90–93, May **1959.** 4 figs., 1 eq. **DLC**—The cause and nature of high waters (mainly i spring), and of the ensuing floods periodically occurring in the plains of the Soviet Union and othe countries are discussed and explained. The problem of high waters, which encompasses a larg field of theoretical and field investigations on the formation and movement of flood waters, thei interaction with various flood control structures, as well as structures built for the purpose of regu lating excess waters and storing them, is discussed in detail. *Subject Heading:* **1. Floods.**—*A.M.P.*

10M–612 551.579.4(510

*Lee, Shuh-Chai (*National Taiwan Univ., Taipei, China*), **Return-period and variability of flood in China.** 26 p. 11 tables, 9 figs., 23 refs. "Reprinted from Essays and Papers in memory of lat President Fu Ssu-nien, **1952.**" **DWB** (M79.4 L481r)—A statistical study based on Gumberl' (1941-51) method of flood frequencies in several basins in China and a comparison with rivers i America (Mississippi. Columbia, Cumberland etc.) using all available data for entire period o record (10 to 126 years) for each basin. It is shown that the coefficient of variation is inversel proportional to drainage area, except for meteorological, topographical and geological condition

which sometimes vary enough to overweight the size of basin. Also length of record makes some difference. *Subject Headings:* **1. Flood frequencies 2. Flood variability 3. Statistical studies 4. China.**—*M.R.*

10M–613 551.579.4:551.515.11(74)

§Lennahan, Charles M. and Holzworth, George C., **Cyclogenesis and floods associated with stagnant cold low, March 25–30, 1953.** *Monthly Weather Review*, 81(3):82–89, March **1953.** 15 figs., refs. **DWB**—A statistical survey of rainfall and floods in New England (March 1953) including damage caused, and a synoptic analysis of the cyclones is presented. Tabulated rainfall amounts and surface and upper air charts are included. Observed rainfall amounts are compared with those computed from an analysis of air flow in the vicinity of New England. *Subject Headings:* **1. Cyclogenesis 2. Floods 3. Rainfall distribution 4. New England.**—*G.T.*

10M–614 551.579.4(492)

Lippert, Fritz (*Bonn*), **Die Hochwasserkatastrophe an der niederländischen Küste Februar 1953.** [Flood catastrophy on the Netherlands coast February 1953.] *Wasserwirtschaft*, Stuttgart, 43(9):234–236, June **1953. DLC**—Description with a map showing the flooded areas. A table compares the maximum water level for 23 locations during the floods in 1825, 1894, 1906, 1916, 1953 and other selected years. The maximum in all cases was observed in 1953 (17–83 cm higher than previously). *Subject Headings:* **1. Floods 2. Netherlands.**—*A.A.*

10M–615 551.579:627.51:551.482(54)

Majumdar, S. C., **Flood control.** *National Institute of Sciences of India, Delhi, Proceedings*, 16(6):463–468, Nov./Dec. **1950.** Abstracted from reprint. **DWB**—A general discussion of watershed management, considering also engineering and legal aspects. *Subject Headings:* **1. Watershed management 2. Flood control 3. India.**—*A.A.*

10M–616 551.501.45:551.579.4

Chow, Ven Te, **Discussion of "Annual floods and the partial duration flood series" by W. B. Langbein.** *American Geophysical Union, Transactions*, 31(6):939–941, Dec. **1950.** fig., 5 refs., 7 eqs. **DLC**—(See *MAB* 2.7–51, July 1951.) The author demonstrates a relationship between annual flood and partial duration series and develops a simple logarithmic relationship between annual maximum discharge and recurrence interval in the partial duration series $y = c \log_e T_p - a$; y = annual maximum, T_p = recurrence interval of hydrologic events in partial duration series and c and a are parameters. *Subject Heading:* **1. Flood frequencies.**—*I.L.D.*

10M–617 551.579.4(438)

Mikulski, Zdzisław, **Katastrofalne powodzie w Polsce.** [Disastrous floods in Poland.] *Czasopismo Geograficzne*, Warsaw, 25(4):380–396, **1954.** 9 figs. (photos), map, 37 refs. **DWB, DLC**—On the occasion of the 20th anniversary of the catastrophic flood of July 1934 in Małopolska, the author reviews the types, causes, location, duration and extent of floods which have occurred in Poland in the past century and a half. Floods are caused by cyclonic storms, cloudbursts and melting snow or break-up of ice. The southern part of Poland is subject to precipitation floods, the north part to spring thaw floods. Local flash floods occur most often in the Plateau regions of Małopolska and Lublin, and storm floods on the Baltic coast. The worst flood in Poland (and in Central Europe) was in Aug. 1814; the Vistula flood in July 1844, in the Oder and Warta in 1854 and 1850. The spring flood of 1888 was notable, and the Oder flood of 1903 also. Spring floods occurred in 1924 and 1940 and summer floods in 1934. *Subject Headings:* **1. Floods 2. Historic floods 3. Poland.** *M.R.*

10M–618 551.579.4(44)

Pardé, M., **Sur les crues survenues en France de 1951 à 1955.** [Floods which have occurred in France between 1951–1955.] (In: I.U.G.G. Association of scientific Hydrology, **Symposia Darcy, Dijon, Sept. 1956 [Proceedings**], Vol. 3, pub. **1957** [?] p. 207–221. tables) **DWB** (M79 161sym). Summary in *Société Hydrotechnique de France, Mémoires et Travaux*, No. 1:38–39, **1957,** and in *La Houille Blanche*, Grenoble, 12(Spec. No. A):284–285, May/June **1957. DLC**—The frequency of major floods during a 5 year period is discussed. The paper treats in detail the rivers Garonne, Adour, Seine, Rhone, and the observations obtained are compared with reported data of previous floods, in the case of the Rhone back to 1840. The floods of other rivers such as the Loire, Dordogne, etc., are treated at some length. The observations relating to the floods between 1951–1955 in France show: a) the grave consequences of repeated or prolonged floods, without any significant recession, on the main waterways, b) the occurrence of heavy floods in the Mediterranean region, and c) the malicious character of summer floods affecting the rivers Seine and Rhone. *Subject Headings:* **1. Floods, France (1951–1955) 2. France.**—*E.K.*

10M–619 551.579.4(282.244

Pardé, M., **Deux récents rapports annuels de la Compagnie nationale du Rhône.** [Two rece yearly reports of the Compagnie nationale du Rhone.] *Revue de géographie de Lyon*, Lyons, 33(4 351–360, **1958.** 1 ref. **DWB**—The examination of the reports of the Compagnie nationale Rhone devoted to the years 1955 and 1956 has enabled the author to supply precise information the monthly and yearly mean flow of the Rhone and excellent commentaries concerning the importa floods which happened in the course of 1955 and 1956. A description of the hydrometric equipme and of interesting data obtained thanks to the gaging of floods, is given. *Subject Headings:* **1. Riv hydrology 2. Floods 3. River discharges 4. Rhone Basin, France.**—*A.V.*

10M–620 551.579.4(54

*Parthasarathy, K. (*Met. Off., New Delhi*), **Floods in the north Indian rivers during June-Ju 1955.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 6(4):295–298, Oct. **1955.** 2 fig table. **DWB, DLC**—The rainfall which preceded the floods that occurred in the Himalayan ris traversing the regions of Uttor Prodash Bihar and Assam is described and both a map showing t area flooded during June-July 1955 and the table giving the rainfall data are presented. The cau of the monsoon during June and July 1955 is analyzed with particular reference to the factors respo sible for the rainfall patterns causing the floods. *Subject Headings:* **1. Floods 2. Rainfall da 3. North India.**—*I.L.D.*

10M–621 551.579.4:551.577.37(4

Schwarzmann, — (*Karlsruhe*), **Hydrologisch bemerkenswerte Erfahrungen über katastropha Unwetterhochwässer in Deutschland.** [Hydrologically notable experience with bad weather floo in Germany.] *Die Wasserwirtschaft*, 43(3):57–62, Dec. **1952.** 5 figs. **DLC**—Catastrophic floo in Germany occur mainly from May to July generally due to cloudbursts after drought period Rainfall intensity 1–4 mm/min, duration about ½ hour. Maximum flood runoff in mountain regio 15–20 $m^3\ sec^{-1} \cdot km^{-2}$. Even dense forests do not have sufficient retention power to prevent cat strophic floods. Author gives examples for different parts of Germany. *Subject Headings:* **1. Flas floods 2. Cloudbursts 3. Germany.**—*A.A.*

10M–622 551.579.4(44

Serra, L. (*Direction des Etudes et Recherches de l'Electricité de France*), **L'étude météorologique de possibilités de crues: application à Durance.** [Meteorological study of the possibility of floods a applied to the Durance River.] Reprint from: *I.U.G.G. Association of Scientific Hydrology, Publ cation*, No. 42:291–299, [1956?]. 3 figs. **DWB**—Study shows distribution of rainfall leading t severe floods on two occasions. The corresponding weather situations are briefly discussed. *Subje Headings:* **1. Storm floods 2. Durance River, France.**—*A.A.*

10M–623 551.579.4(68

*South Africa. Dept. of Irrigation, **Report on flood peak probabilities.** *I.U.G.G. Associatio of Scientific Hydrology, Brussels, 1951*, [*Transactions*], Vol. 4, pub. **1952.** p. 66–69. tables. **DWI** —Catchment areas (A in sq miles), maximum observed floods and average annual rainfall are give for a large number of river basins in South Africa. The 1% chance of flood in cases per sq mile i $q^5 = K_1\ 1330A^{-0.1}$, where K is a catchment characteristic, which varies between 0.1 and 2.8 but doe not depend on annual rainfall or size of catchment. *Subject Headings:* **1. Hydrologic data 2. Maxi mum floods 3. Flood probability 4. South Africa.**—*A.A.*

10M–624 551.579.4(73

*Switzer, Frederich George and Miller, H. G., **Floods.** *Cornell Univ. Engineering Experimen Station, Bulletin*, No. 13, Dec. 15, **1929.** 12 p. 11 figs., 3 tables, 11 refs. **DWB**—Study show floods to be expected on an average once in 100, 1000, or 10,000 years, as obtained from 8 differen types of data: 1) all daily flows, 2) all above 5,000 sec. ft., 3) peak flows above 10,000 sec. ft., 4) 15,000 5) 20,000, 6) 25,000 sec. ft., 7) annual peaks, and 8) monthly peaks. Results of computation o flood problems for different length of record (20, 30 and 45 years) at Chattanooga and The Dalle on the Tennessee and on the Columbia River, are given. Map and table give floods and 100 yea rainfall for 42 streams or locations in U. S. A., with isolines for all of U. S. A. *Subject Headings* **1. Flood probability 2. Flood data 3. Maximum floods 4. U. S.**—*M.R.*

10M–625 551.579.4:(522)

Tabata, Shichiro, **The cyclic records of the river Chikugo and Ono calculated from the record of disasters.** *Journal of Meteorological Research*, Tokyo, 9(10):748–749, Oct. **1957.** 2 tables, 4 refs. In Japanese. **DWB, DLC**—Twelve recorded floods of the Chikugo River from 1658–1953 and recorded floods of the Ono River from 1635–1943 are listed and described from the records of disasters

he average flood cycle of the Chikugo River seems to be about 37 years and that of the Ono River bout 35 years. *Subject Headings:* **1. Flood cycles 2. Flood damage 3. Japan.**—*J. Woo.*

10M–626 551.579.4:551.577.61(73)

U. S. Weather Bureau, **Flood losses in major river basins of the United States, 1924–1955.** ts *L. S.*, 5606, Jan. 13, **1956.** fig. **DWB**—Map of U. S. with data for 14 basins. Missouri Basin eads with $1.6 billion loss 1924–55; North Atlantic second with $1 billion. *Subject Headings:* **1. Flood damage 2. United States.**—*M.R.*

Specific Floods (551.579.4)

10M–627 551.579.4

Velikanov, M. A., **Summirovanie pavodkov slivaiushchikhsia rek.** [Summation of floods of onfluent rivers.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 44(71):3–7, **1956.** 4 figs., refs., 5 eqs. **DWB**—When two rivers of different phase come together they mutually support one nother. The solution of the problem involving the summation of the flood hydrograph of two onfluent rivers is achieved by means of the equation of unstable motion in which the inertial terms re neglected for a river flow, namley $\frac{\partial q}{\partial s}+\frac{\partial \omega}{\partial t}=0$, $-\frac{\partial z}{\partial s}=\frac{q^2}{k^2}$ where z is the water level mark on horizontal plane, s = distance along the dynamic axis of the current from some chosen point; t = time; = water discharge; ω = area of active cross section and k = modulus of discharge $k=c\omega\sqrt{R}$. In rder to solve this problem, the assumption is made that for any point of a river it is possible to onstruct an approximate unique relationship $q(H)$, the so-called discharge curve. The discharge f water during a flood always depends not only upon the height of the standing level but also upon he surface slope, which is altered during the flood more in the front than in the rear. It is shown that he summation hydrograph is obtained by combining, for each moment of time, the water discharge f the supporting river computed by the equation $H=F\left(t-s_0{}^s\frac{d_s}{v_H}\right)$ with computation from horizon o discharge according to the curve $q(H)$, the differential $\frac{\partial v}{\partial t}$ and the discharge of the supported iver from the equation $q(t)=k(t)j(t)$. *Subject Heading:* **1. Flood hydrographs.**—*I.L.D.*

10M–628 551.579.4:551.509.318(497.2)

Dimitrov, D. Iord, **Belezhki vurkhw sinoptichnite usloviia za silnoto priizhdane na r.r. Arda i Struma na 13 i 14 II.1956 god.** [Notes on synoptic conditions for flooding of the Arda and Struma Rivers on Feb. 13 and 14, 1956.] *Khidrologiia i Meteorologiia*, Sofia, No. 3:36–44, **1956.** 6 figs. Russian and English summaries, p. 43–44. **DLC**—Shortly before the middle of Feb. conditions avoring cyclonic disturbances were created in the region of Italy. The cyclone which was activated noved to the Hungarian plain, in consequence of which warm air began to spread over the Balkan Peninsula, first in higher altitudes and then near the ground. Under the influence of orography, in many places, and in particular in the valleys of the Arda and Struma rivers, föhn conditions were roduced. This caused a still greater increase in temperature. Moreover, shortly afterwards rain began to fall. The combination of these factors caused major flooding of the Arda and Struma rivers nd avalanches in the Macedonian and Bulgarian mountains. *Subject Headings:* **1. Synoptic conditions for floods 2. Floods 3. Bulgaria.**—*From author's abstract.*

10M–629 551.579.4(931)

Finkelstein, J., **Waikato flood of July 1953.** *New Zealand. Meteorological Service, Technical Note*, No. 108, Feb. 25, **1954.** 7 p. 3 figs., 6 tables. **DWB**—Rainfall measurements in the catchment of the Waikato River are presented for the period immediately preceding the flood of July 7 1953, when the most extensive flooding since June 1907 occurred. Four-day totals for July, 3–6 1953, reached 4 to 6 inches over most of the catchment. Records made over 50 years at Hamilton, Taupo and Waiotapu show that greater 3- and 4-day rainfalls were of about the same magnitude as in July 1953, but the flooding was much less serious. Possible explanations for this are suggested. *Subject Headings:* **1. Floods 2. Waikato River, New Zealand.**—*Author's abstract.*

10M–630 551.579.4 551.577.37(44)

Fontaine, P., **Analyse succincte des conditions météorologiques qui ont été à l'orgine de la crue de la Seine en janvier 1955.** [Brief analysis of the meteorological conditions responsible for the Seine flood of Jan. 1955.] *La Météorologie*, Paris, No. 42:105–115, April/June **1956.** 7 figs., 7 footrefs. English and Spanish summaries p. 105. Also in *Société Hydrotechnique de France, Mémoires et Travaux*, 2(2):111–116, **1955.** figs., tables. **DWB**—The floods affecting the Seine Basin at the

beginning of the second decade of Jan. 1955 were produced by the rainy conditions over Fran between the 11th and 17th Jan. The exceptional severity of these conditions can be attributed dynamic and orographic factors which brought about the vertical movement of masses of hot, ve humid air over France coupled with a strong oceanic current of tropical origin. The Paris flood le of Jan. 1955 was much lower than that reached in Jan. 1910, although both floods were preceded rainy periods of similar intensity; this could very well be attributed to the effectiveness of the pr ventive measures adopted in the Seine Basin. *Subject Headings:* **1. Floods 2. Excessive precipit tion 3. Paris, France.**—*Author's abstract.*

10M–631 551.579.4(412

Green, F. H. W., **The Moray floods of July and August, 1956.** *Scottish Geographical Magazir* Edinburgh, 74(1):48–50, April **1958.** fig., 2 refs. **DLC**—"Postmortem" studies of floods in mediately after their occurrences have received a great deal of attention from the River Flow Studi Committee of the Royal Scottish Geographical Society. The purpose is that such studies w eventually lead to an understanding of the nature and causes of present-day floods. This report t on the floods of July and August, 1956, in the Scottish counties of Moray and Nairn and their adjace areas. With the help of voluntary "flying squads" and county surveyors it was possible to identi the cause and the course of the flood, as well as the location of the two foci of the flood water the area. Winds were on-shore, rainfall reached, in some areas, 10 in. in 72 hours, and the foci we centered about the head reaches of the Findhorn and Nairn. Generalized isohyets are given for th period during the 72 hours ending 0900 G.M.T. on July 31, 1956 in the Moray Firth area. Questio presenting themselves as a result of this investigation are included. *Subject Headings:* **1. Floo studies 2. Moray, Scotland.**—*N.N.*

10M–632 551.579.4(497.

Grüncharov, D., **Navodneniiata na reka Maritsa prez 1957 g.** [Floods of the Maritsa Riv in 1957.] *Khidrologiia i Meteorologiia*, Sofia, No. 4:26–42, **1958.** 5 figs., 5 tables. Russian ar English summaries, p. 41–42. **DLC**—Floods of the past, and especially those of 1858 and 1911 a briefly reviewed. The last two floods, those of June and Sept. 1957 are discussed in greater deta Data on rainfall, discharge, damage, etc. are presented. *Subject Headings:* **1. Historic flooo 2. Floods 3. Maritsa River, Bulgaria.**—*Author's abstract.*

10M–633 551.579.4(438

Lambor, Julian, **Pôwódz w dorzeczu Bugu i Narwi w kwietniu 1958 roku.** [The flood on th Bug and Narew Rivers, April 1958.] *Acta Geophysica Polonica*, Warsaw, 6(4):362–371, 1958 8 figs., table. English summary, p. 370–371. **DWB, DLC**—In April the Bug and Narew rive valleys were visited by floods which had catastrophic consequences. Similar floods had occurre previously in 1924 (absolute maximum for the Bug river) and in 1888 (absolute maximum for th Narew river). The maximum 1924 water levels on the Narew were surpassed and the 1888 leve nearly reached so that this was one of the heaviest floods so far noted. Taking into account th magnitude of its culmination, the probability of occurrence may be determined for Wyszkow a $p = 3\%$, i.e. once in 33 years. Even higher maxima were observed in the Zegrze sector at the con fluence of the Bug and Narew rivers where the probability of occurrence may be estimated at 2.2% i.e. once in 45 years. The travelling velocity of the peak flood wave was 4.8 km/hr for the Bu River. Maximum discharge on the lower Narew was estimated at 1300 m^3/sec and on the lower Bu at 1400 m^3/sec. The high water persisted for an exceptionally long time, the period between the ris of the flood and recession lasting nearly $1\frac{1}{2}$ months. During this period about $4 \times 10^9 m^3$ of wate were discharged by the two rivers into the Vistula. We may note as a characteristic feature that th maximum floods so far observed on the Bug and Narew rivers have been occurring at 30 and 35 yea intervals (1888, 1924, 1958) which coincides—perhaps only fortuitously—with Brückner's perioo The cause of this exceptionally large flood was the high state of water retention in the river basin since fall 1957, which was further increased by the heavy rainfalls of spring 1958, exceeding in th northwestern parts of Poland the mean March and April values for many years back by 100% Precipitation accumulated in the snow cover on ground already saturated with water. The atmos pheric pressure situation—although not showing anomalies at the time— was nontypical and ver unfavorable, as the relatively sharp rise in temperature since the beginning of April (reaching 15°C at the middle of the month) had been causing rapid snow melting and heavy runoff. The develop ment of hydrological and meteorological factors, although atypical, did not announce extrem flood danger, so that one may anticipate the possibility of situations much more unfavourable an even more dangerous in their consequences. A characteristic feature of the present case was th important role of ground water retention and its influence on the magnitude of the flood wave *Subject Headings:* **1. Flood frequency studies 2. Maximum floods 3. Synoptic conditions for flood 4. Bug River, Poland 5. Narew River, Poland.**—*Author's abstract.*

10M–634 551.579.4:551.577.37(729.5)

*Long, Thomas L., **Puerto Rico floods of September 22–23, 1952.** San Juan, P. R., Oct. 1952. p. 5 figs., photos. **DWB**—Meteorological conditions on Sept. 22–23, 1952, for Puerto Rico are described and isohyetal charts showing total rainfall for 48 hours, departure from normal, precipitation for Sept. 1952, and average Sept. rainfall for the whole island are presented. Photographs show flood scenes and damage. Floods were caused by a series of 3 easterly waves which passed over Puerto Rico in 72 hours, giving southerly flow and rainfall equalling the average monthly total at most stations on the southerly slopes of the ranges. Greatest amounts were 18 in. or more in 48 hours. *Subject Headings:* **1. Floods 2. Excessive rainfall 3. Easterly waves 4. Puerto Rico flood (1952) 5. Puerto Rico. I. U. S. Weather Bureau.**—*M.R.*

10M–635 551.579.4(282.244.14)

Moreau, J. P., **La crue de la Seine en Janvier 1955 à l'amont de Paris.** [The flood on the Seine, in January 1955, upstream from Paris.] *Revue du Nord*, Lille, France, 37(147):57–64, July/Sept. 1955. table, figs., 2 refs. **DLC, DWB**—Results of a detailed analysis of the causes of the Jan. 1955 flood of the Seine (second worst in 200 years), based on a comparison with the disaster of Jan. 1910. It is shown that the difference in amplitude and effects of the two floods in more likely to be due to the dissimilarity in sequence of atmospheric processes than to the effect of newly constructed dams or the preceding unevenly distributed saturation of the soil. It is shown that the repeated rainfalls observed in 1910 were contrasted by a kind of stagnation towards mid-Jan. 1955. Besides, the maximum occurred earlier in 1955 and was less intensive than in 1910, even if the two heights of water levels were rather close. The author concludes that even if the deepening of the river bed, especially at Paris, and the retaining dams along the upper basin could have partially accounted for the difference, the main cause was the different development of atmospheric processes which caused the two separate cloudbursts in 1910 which whipped up the rapid river in the center of the basin, and the repeated small rainfalls in 1955 which affected the slow but steady rise of rivers in the eastern border in 1955. *Subject Headings:* **1. Floods, Seine River (Jan. 1955) 2. Seine River, France.**—*A.M.P.*

10M–636 551.579.4:551.515:551.577.37(759)

Musgrove, Rufus H. (*U. S. Geological Survey*), **Flood of June 9, 1957, at Perry, Florida.** *Florida. Geological Survey, Information Circular*, No. 17, **1958.** 12 p. 8 figs. **DWB** (M79.4 F632fL)—There was a tropical disturbance on June 7 and 8, 1957, in the Gulf of Mexico which brought heavy rains to the San Pedro Bay areas and the streams in the vicinity of Perry, Taylor County, Florida, were flooded on June 9, 1957. Data on the rainfall that accompanied the storm and peak flows of Spring and Pimple creeks in Perry are presented and discussed, and a description of the general features of the flood is given. *Subject Headings:* **1. Floods, Florida (June 9, 1957) 2. Flood-rainfall data analysis 3. Perry, Taylor County, Fla.**—*N.N.*

10M–637 551.579.4(548.7)

Mylvaganam, T., **Analysis of the 1947 flood in the Kelani Ganga Basin, Ceylon.** *I.U.G.G. Association of Scientific Hydrology, Brussels, 1951,* [*Transactions*], Vol. 4, pub. **1952.** p. 86–97 tables (some fold.), figs. **DWB**—Detailed daily rainfall data for the whole catchment and a number of sub-catchments are compared with the hydrograph of flood of unprecedented magnitude, which caused catastrophic damage in the capital of Ceylon. The estimated maximum discharge was 140,000 cu m/sec from 805 sq. m. Empirical formulas indicate that over 200,000 and even over 300,000 cu m/sec might be possible. *Subject Headings:* **1. Maximum floods 2. Kelani Ganga River, Ceylon 3. Colombo, Ceylon.**—*A.A.*

10M–638 551.579.4(282.244.3)

Pardé, M., **Les crues dans le bassin du Rhône en décembre 1954 et janvier 1955.** (The floods in the Rhone basin during December 1954 and January 1955.) *Annales de Géographie*, Paris, 67(363): 448–452, Sept./Oct. **1958. DLC**—Summary of the main characteristics of the important floods which occurred in the Rhone basin during Dec. 1954 and Jan. 1955, and comparisons with the flows and heights observed during earlier floods. *Subject Headings:* **1. Floods 2. Rhone Basin, France.**—*A.V.*

10M–639 551.482:551.579.4(282.244)

Pardé, M., **La grande crue de la Garonne en janvier 1955.** [The great flood of the Garonne in Jan. 1955.] *Annales de Géographie*, Paris, 67(363):452–454, Sept./Oct. **1958. DLC**—Statement of the main facts relating to the floods which occurred in the Garonne basin during Jan. 1955. Comparison is made of the maximum levels and flows of this flood with those observed during earlier floods. *Subject Headings:* **1. Floods 2. Garonne Basin, France.**—*A.V.*

10M–640 551.579.4(5

Parthasarathy, K. (*Met. Office, New Delhi*), **Kaddam River flood of August 31, 1958.** *Ind Journal of Meteorology and Geophysics*, Delhi, 9(4):410–411, Oct. **1958.** fig., ref. **DWB, DL** The flood of Aug. 31, 1958, over the Kaddam River occurred because the discharge was more t double the estimated capacity of 250,000 cu m/sec. The peak discharge was 574,000 cu m/sec. study of the causes of the flood has urged an examination of the current year's flood and the adopti of a new design policy for any further damming of the river, using this peak discharge as an ind *Subject Headings:* **1. River discharges 2. Flood analysis 3. Floods, Kaddam (1958) 4. Kadd River, India.**—*N.N.*

10M–641 551.579.4(44) 627

Tricart, J., **La crue de la mi-Juin 1957 sur le Guil, l'Ubaye et la Cerveyrette.** [Flood of t Guil, Ubaye and Cerveyrette Rivers in mid-June 1957.] *Revue de Géographie Alpine*, Grenob 46(4):567–587, **1958.** 2 tables. **DWB**—During mid-June of 1957 the valleys of Guil, Cerveyre and Ubaye (all in France) were badly hit by a catastrophic flood that completely isolated citi towns and villages about the area for several weeks. This report deals with the financial, as well the physical conditions that had to be created in order to avert any such catastrophies in the futu A study was conducted of the general aspects of floods in the area, the circumstances that set t 1957 flood in motion, and of the effects of the flood on the normal course of water in the area. T meteorological data collected just before and during the catastrophy showed ample precipitation the surrounding mountains and the movement of large air masses into the area. *Subject Headin* **1. Floods 2. Flood control 3. France.**—*N.N.*

Methods of Flood Computation (551.579.4:551.501)

10M–642 551.501.5:551.57

Benson, Manuel A. (*U. S. Geological Survey, Wash., D. C.*); Linsley, Ray K. (*Stanford Uni* and Hershfield, David M. (*USWB*), [**Discussion of**] **R. Robinson Rowe; Gordon L. Long a Thomas C. Royce: Flood frequency by regional synthesis (and Reply) by Rowe, Long and Roy** *American Geophysical Union, Transactions*, 39(5):974–980, Oct. **1958.** fig., 8 refs., eqs. **DW DLC**—In this discussion reasons are given why it is believed that the station-year method for annu flood data will give misleading results. The resultant regional curves for this method do not rep sent a central tendency. The Department of Water Resources and Highways of California h suggested that the dominant storm should be defined, the peaks from recessive storms be identifie and the excluded peaks should be replaced with the lesser ones from storms of the dominant typ They illustrate the applicability of the method to any improved procedure. (For original paper 9.8–236, Aug. 1958, *Met. Abs.*) *Subject Headings:* **1. Flood frequency calculations 2. Flood fr quency curves.**—*N.N.*

10M–643 551.579.4 551.48.0

Cappus, P., **Le calcul des crues. Résultats obtenus sur le terrain expérimental d'Alranc** [The computation of floods. Results obtained on the Alrance experimental area.] *La Houi Blanche*, Grenoble, 8 (Spec. No. A):159–167, March/April **1953.** 13 figs. **DLC**—The unit hydr graph was constructed on the basis of the flood curve produced by an isolated shower. Combin hydrographs were in fair agreement with limnograph records. A further discussion is devoted the computation of the unit hydrograph on the basis of topographical characteristics, analyzing recent paper by Taylor and Schwarz (*see item* 4.5–182, May 1953, *MAB*). *Subject Heading* **1. Hydrographs 2. Topographic effects 3. Alrance, France. I. Taylor, Arnold B. II. Schwar Harry E.**—*A.A.*

10M–644 551.579.4:519.2

Debski, Kazimierz (*Poland*), **Equation des débits maxima probables.** [Equation of the probab maximum discharge.] *I.U.G.G. Association of Scientific Hydrology, Brussels, 1951,* [*Transactions* Vol. 4, pub. **1952.** p. 61–65. figs., table, eqs. **DWB**—A probability method based on the media (Q_2), lower (Q_1) and upper quartil (Q_3) computed from observed data. The maximum flood wit the probability p is

$$Q_p = Q_2\left(\frac{Q_3}{Q_1}\right)^z, \qquad \left(\frac{Q_3 Q_1}{Q_2 Q_2}\right)^w \left(\frac{Q_3}{Q_1}\right)^b.$$

z = a linear function of probability, w = an empirical function of probability, and b are tabulate dependent on p and the number of observations. *Subject Headings:* **1. Maximum flood probabili 2. Statistical studies.**—*A.A.*

10M–645 551.326.83(43–17)551.579.4(43 17)

*Hahn, Arthur, **Uferlinien-Wasserstand, Hochwasser- und Eisstatistik norddeutscher Gewässer.** Bank line-water level, flood and ice statistics for bodies of water in north Germany.] *Deutsches Gewässerkundliches Jahrbuch, Besondere Mitteilungen*, No. 6, **1952.** 45 p. tables. At head of t-p: Herausgegeben von der Bundesanstalt für Gewässerkunde in Bielefeld. **DWB**—The climatologist will find detailed numerical data on ice conditions for a number of rivers within the former borders of Germany northwards from Neckar and Main (except East Prussia). Statistical methods in water level and flood studies are discussed. *Subject Headings:* **1. River ice 2. Flood data 3. Germany.**—*A.A.*

10M–646 551.579.4(767)

Hopkins, Charles D., Jr. (*Tulsa River Forecast Center, U. S. W. B., Tulsa, Oklahoma*), **The celerity of very large flood waves in the Arkansas Basin.** *American Geophysical Union, Transactions*, 34(4): 594–596, Aug. **1953.** fig., 3 tables. **DWB**—Crest travel time versus crest height plotted for three rivers in the Arkansas Basin shows that the celerity decreases at first with height due to greater roughness and then increases again for very large floods when the whole valley is flooded. *Subject Headings:* **1. Flood waves 2. Arkansas Basin.**—*A.A.*

10M–647 551.579.4(497.2)

Karal'ozov, Ia., **Visokata vulna na iazovir "Topolnitsa."** [The maximum flood water at Topolnitze Dam.] *Khidrologiia i Meteorologiia*, Sofia, 1:17–23, **1957.** 4 figs., 6 refs., 9 eqs. Russian and English summaries, p. 23. **DLC**—The maximum possible (1000 year) flood at Topolnitze Dam is calculated on the basis of existing hydrometric, geographic and climatic data for the Topolnitze Basin for 1919–1954. *Subject Headings:* **1. Maximum possible flood 2. Topolnitze Dam, Bulgaria.**—*From author's abstract.*

10M–648 551.579.4:551.501

Lambor, Julian (*Professor, Warsaw Polytechnic*), **Probable floods curve as function of regional parameters.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957*, [*Transactions*], Vol. 3, pub. **1958.** 3 figs., 3 tables, 7 eqs. French summary, p. 300. **DWB** (M(06) 161lg)—A cumulative frequency curve is discussed, and preferred to the present statistical curve applied in the calculation of the definite probability of flood occurrence. A sample curve is given concerning the Warta River (a right-hand tributary of the Odra) near Poznan (drainage area 25,117 km²) where observations of water level had been conducted systematically for 130 years. The curve indicates the relation between the magnitude of the flow and the probability of occurrence of floods. This better fits the course of the problem. *Subject Headings:* **1. Flood frequency curves 2. Flood probability calculation 3. Warta River, Poland.**—*N.N.*

10M–649 551.579.4:551.482(282.244.3)

Larrieu, Jean, **Évaluation des crues catastrophiques par la méthode des hydrogrammes synthétiques.** [Evaluation of disastrous floods by means of composite hydrographs.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957*, [*Transactions*], 3, pub. **1958.** p. 160–173. 11 figs., French summary, p. 160. **DWB** (M(06) 161lg)—The author discusses the physical and statistical methods of evaluating disastrous floods and also outlines the problems involved in such evaluation as far as the composite hydrographs for the basins are concerned. Various parameters for the evaluation of disastrous floods have been determined. *Subject Headings:* **1. Flood analysis 2. Flood hydrographs.**—*N.N.*

10M–650 551.579.4:551.577.37(54)

Madan, M. L. and Rao, T. R. A. (*Indian Central Water and Power Commission*), **Applicability of various methods of determining design flood to Tapi catchment.** *Irrigation and Power*, Simla, 9(3):461–471, July **1952.** 6 figs., 2 tables, 16 refs. **DWB**—Since no sufficient discharge data were available for the Tapi catchment and empirical formulas were not considered reliable enough, the maximum possible flood was derived from rainfall observations. Storm rainfalls since 1891 were analyzed and an envelope of depth-duration curves derived. Data are given for successive 1-, 2-, and 3- day rainfalls. Results are compared with GUMBEL'S method. *Subject Headings:* **1. Maximum floods 2. Excessive rainfall 3. Tapi catchment, India.**—*A.A.*

10M–651 551.579.4:551.501

Mookerjee, D. (*Deputy Dir., River Res. Inst.*), **Empirical formulae for the estimation of maximum flood runoff.** *I.U.G.G. International Association of Scientific Hydrology, Brussels, 1951*, [*Transactions*], Vol. 4, pub. **1952.** p. 98–103. fig., table, eqs. **DWB**—Survey of relationships for the estimation of maximum floods lists 20 empirical formulas, based mainly on area of catchment, average or maximum intensity of rainfall, length of catchment area, etc., and discusses in more detail

the rational method, FULLER'S formula and the formula of the Boston Society of Civil Engineer but does not give a single reference. *Subject Headings:* **1. Maximum runoff 2. Flood estimatio —A.A.**

10M–652 551.579.4:551.480.1

Nash, J. E., (*Hydraulics Res. Station, England*), **The form of the instantaneous unit hydrograph** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept 1957*, [*Transactions*], Vol. 3, pub. **1958.** p. 114–121. 5 figs., table, 6 refs., 6 eqs. **DWB** (M(00 1611g)—An equation is derived for the instantaneous unit hydrograph by assuming that the operatio performed by the catchment on the effective rainfall is analogous to that performed by routin through a series of linear reservoirs. A method by which the "best fit" instantaneous unit hy drograph of this form can be derived from a complex flood is demonstrated. *Subject Heading* **1. Unit hydrographs.**—*Author's abstract.*

10M–653 551.579.

Richards, B. D. (*Consulting Engineer, London*), **Estimation of flood run-off.** (In: Unite Nations Scientific Conference on the conservation and Utilization of Resources, Lake Success, N. Y 1949, **Proceedings, v. 4, Water Resources,** p. 48–52, **1951.** 5 figs., 7 refs., 9 eqs.) **DWB**—Th author shows how to calculate the dependence of maximum flood runoff on the catchment area fo different regions, the time of concentration and the hydrograph for rising and falling flood. Th influence of the storm areas and of moving storms is discussed. *Subject Headings:* **1. Flood estimatio 2. Hydrographs.**—*A.A.*

10M–654 551.579.4:551.577.33

Richards, B. D. (*Great Britain*), **Hydrology of floods—flood discharge.** *I.U.G.G. Associatio of Scientific Hydrology, Brussels, 1951*, [*Transactions*], Vol. 4, pub. **1952.** p. 168–178. 7 figs., eqs **DWB**—A method of flood estimation is outlined, based on the period of concentration (t), the area depth and the time-depth functions of precipitation intensity. The use of the method is mainl dependent on adequate rainfall records and not on river flow measurements. It is $\frac{t^3}{t+1} = \frac{CL^2}{K \cdot S \cdot Rf(a}$ C =variable, tabulated in relation to KR; K =coefficient of runoff; $R = F(T + 1/T)$; F =total rainfa intensity, T =duration of storm in hours; L =length of catchment, S =slope of the catchment $f(a)$ =ratio of the average intensity of the rainfall to the maximum spot rainfall, dependent on th area. *Subject Headings:* **1. Flood estimation 2. Rainfall intensity.**—*A.A.*

10M–655 551.579.4(931

*Schnackenberg, E. C. (*Min. of Works, N. Z.*), **Extreme flood discharges.** Wellington, Ferguso and Osborn, **1949.** p. 376–427. tables, graph. **DWB**—The maximum flood discharge dat presented for rivers in New Zealand, America, Australia, India, Europe, Africa, etc., were taken fro a total of about 1,250 records chosen from a period of over 100 years. They are arranged in term of drainage area, average discharge, flood peak, data of flood and quotation of authority. The formula $Q = 20{,}000\ M^{\frac{3}{4}}$ is presented for estimating discharge, where Q is the total discharge from th catchment area in cu. ft. per sec. and M the drainage area in square miles. The formula is applie to New Zealand and compared with a formula by J. WOOD and with actual records. *Subject Head ings:* **1. River discharges 2. Flood estimation 3. New Zealand. I. New Zealand. Institution o Engineers, Wellington, New Zealand.**—*G.T.*

10M–656 551.579.4:519.24

Schnell, Karl, **Zur wahrscheinlichkeitstheoretischen Behandlung der Frage der Hochwasser häufigkeit.** [The application of probability theory to the problem of flood frequency.] *Deutsches Gewässerkundliches Jahrbuch, Besondere Mitteilungen*, Koblenz, No. 12:93–106, **1955.** 5 tables numerous eqs. **DWB**—Two different probability functions are developed with particular attentio to floods occurring every 30 to 50 yrs. Results obtained with these formulas are compared wit those derived from a Gaussian distribution, with those of Fechner's functions, and with observed values. One of the author's methods (called the S-method) has also been successfully applied t meteorological problems, e.g. to the study of the frequency of severe and mild winters. *Subjec Headings:* **1. Flood frequencies 2. Probability functions.**—*G.T.*

10M–657 551.577:551.579.4:551.437

Steinhäusser, Hans, **Hochwasserspenden und mittlerer Jahresniederschlag.** [Flood discharges and mean annual precipitation.] *Germany. Deutscher Welterdienst, Berichte*, 8(54):123–125, **1959** fig. German, English and French summaries, p. 123. **DWB, DLC**—The flood discharge of a river, for example the 100-year' flood, depends on the intensity and duration of rainfall, besides the

noff of the basin. Some authors directed attention to the possibility of a correlation between the ecific flood discharge and the mean annual total precipitation. Such relation, valuable for the luents of a large basin, enables one to sketch a map of the 100-year flood of the affluents in a basin. he method is tried for the basin of the Drave in the South Alps. *Subject Headings:* **1. Flood discharges 2. Flood estimation.**—*Author's abstract.*

10M–658 551.501.45:551.577:551.579.4

Wierzbicki, Zenon, **Możliwość wyliczania opadów powodziowych.** [Possibility of calculating ecipitation causing flood.] *Przeglad Meteorologiczny i Hydrologiczny*, Warsaw, 6(3/4):76–79, **1953.** ib. **1954.** 2 tables, 4 eqs. English summary p. 79. **DWB**—The applicability of Z. L. TURKETTY'S rmula (based on the assumption that areas of most intense precipitation coincide with strongest rtical air currents), by means of which it is possible to calculate potential precipitation, is examined the basis of flood data for May 10, 1952. This formula can also be applied to flood precipitation the Carpathians provided that the coefficient, instead of 0.01, will be 0.16. The formula for the aily intensity of precipitation will then be: $R_B = 016 \int_{P0}^{Pn} gdp$. *Subject Headings:* **1. Precipitation lculations 2. Flood forecasting 3. Rainfall intensities.**—*A.M.P.*

SOIL MOISTURE (551.579.5)

10M–659 551.579.5:631.4(492)

Bijkerk, C., **Hydrologische aspecten van de Drentse bodemtypen.** [Hydrological aspects of il types in Drente.] *Landbouwkundig Tijdschrift*, Wageningen, 70(12):858–874, Dec. **1958.** figs., 2 tables, 11 refs. **DA**—The soils in Drente are subdivided into three types: high, middle high nd low soils. For each of these categories, the geological structure and the hydrological aspects are vestigated. In the field of hydrology are successively treated: the present situation, the ameliora- on abilities and the technical cultivation measures that can be taken. For high soils, the problem additional water supply is of primary importance, whereas for the low soils, water-drainage is vestigated. *Subject Headings:* **1. Hydrology 2. Soil hydrology 3. Drente, Netherlands.**—*A.V.*

10M–660 551.577.38:551.579.5(776)

*Blake, G. R.; Boelter, D. H. and Strub, J. H., Jr., **Soil moisture conditions in Minnesota, lay 1, 1957.** [1957.] 2 p. table, 2 charts. **DWB** (M79.5 B636s)—Precipitation and departure om normal for period Sept. 1956 through April 1957 for Minnesota for 43 stations (1931–55) is iven in a table and anomaly shown on a map of the state. Subsoil moisture reserves as of May 1, 957, are also shown on a map. Deficiencies were extreme (nearly drought) in the southern portion nd considerable over most of the state. *Subject Headings:* **1. Soil moisture data 2. Drought, Minnesota (1956–57)**—*M.R.*

10M–661 551.579.5:634.94(473)

Bol'shakov, A. F., **Vodnyĭ rezhim moshchnykh chernozemov v period zasukhi 1946–1947 gg.** Water regime of thick chernozam during the drought of 1946–1947.] *Akademiia Nauk SSSR, Pochvennyĭ Institut, Trudy*, 32:350–368, **1950.** 3 figs., 7 tables, 8 refs. **DLC**—Soil moisture data re analyzed up to a depth of 1000 cm, and soil moisture isopleths under steppe vegetation and in a orest, up to 350 cm are compared with the course of precipitation. The forest consumed about hree times as much as the steppe. *Subject Headings:* **1. Soil moisture 2. Forest influences . Kursk, U.S.S.R.**—*A.A.*

10M–662 551.579.5:631.43

Bolt, G. H. and Miller, R. D., **Calculation of total and component potentials of water in soil.** *American Geophysical Union, Transactions*, 39(5):917–928, Oct. **1958.** 7 figs., 17 refs., 39 eqs. **DWB, DLC**—The total potential of water in moist soil is assumed to be the sum of gravitational, pressure, osmotic and adsorption components. Osmotic potential is related to solute concentration at any point. Adsorption potential is assumed to depend on interaction of water dipoles with electric fields associated with the solid-liquid interface. The Gouy-Chapman theory of the electric double layer provides a basis for computing both osmotic and adsorption soil particles. From these, pressure potential can be calculated. Curves illustrating the variation of component potentials with distance from a particle are presented along with curves relating total potential to film thickness for soils brought to hydraulic equilibrium or to vapor equilibrium with external solutions. Measurement of total potential by freezing point depression is questioned. *Subject Headings:* **1 Potential soil moisture 2. Soil moisture calculations.**—*Authors' abstract.*

10M–663 536.7:551.57

Bolt, G. H. and Frissel, M. J. (*both, Laboratory of Soils and Fertilizers, State Agricultural U. versity, Wageningen*), **Thermodynamics of soil moisture.** *Netherlands Journal of Agricultu Science*, Wageningen, 8(1):57–78, Feb. **1960.** fig., 15 refs., eqs. English summary p. 57. **DLC** The various equations used by several authors to express the partial molar free energy of soil moistu as a function of certain parameters are compared with a "parent" equation derived in this pap It is pointed out that aside from differences in terminology also some more basic differences approach seem to exist, which only lead to identical results under certain limiting conditions. It shown that from this "parent" equation some equations with practical applicability may be derive The methods available for the experimental determination of the partial molar free energy of s moisture are reviewed, with special reference to the assumptions underlying the application of t freezing point depression of soil moisture. *Subject Heading:* **1. Soil moisture physics.**—*Author abstract.*

10M–664 551.57

*†Broadfoot, Walter M. and Burke, Hubert D. (*Southern Forest Exp. Station*), **Soil-moistu constants and their variation.** *U. S. Forest Service. Southern Forest Experiment Station, Occasion Paper*, No. 166, **1958.** 28 p. 7 figs., 16 tables, numerous refs. **DWB** (M79.5 U5820 No. 166) The Vicksburg Research Center of the Southern Forest Experiment Station has accumulated da for several years on the effects that physical properties have on soil hydrology, and have present the results of their investigation in a summary form. Various estimates of the available wat capacity, the 15-atmosphere constants, the soil moisture constants, as related to land use and aer tion, and the bulk density from soil properties, have been evaluated and compared. Fourte tables on these are provided to serve as an index to similar studies. *Subject Heading:* **1. Soil moistu constants.**—*N.N.*

10M–665 551.501:551.57

Chudnovskiĭ, A. F., **Novyĭ metod opredeleniia vlazhnosti pochvy.** [A new method for determi ing soil moisture.] (In: Soloveĭchik, R. E., ed., **Fizka atmosfery**, Leningrad, Gidrometeoizdat, **1944** p. 30–51. 9 figs., 26 refs.) **DLC**—The various known methods of determining soil moisture a examined critically; these are as follow: weighing before and after desiccation, methods of distillatic and extraction of soil, the determination of soil moisture by change in specific weight of alcoh mixed with soil moisture, the use of carbide reaction with water, heating of soil at temperature 200–250°C, measurement of the water tension of soil, and the electrical resistance technique. Th thermal method for determining soil moisture which is based upon heat capacity, thermal condu tivity, and temperature conductivity are discussed from the theoretical and experimental aspect The author proposes a new method for determining soil moisture; the thermal characterist $y = \sqrt{\lambda C p}$ (where λ = heat conductivity of soil, C = specific heat capacity of soil and p = soil density is measured and is used as an index of soil moisture. *Subject Headings:* **1. Soil moisture measureme 2. Soil heat conductivity.**—*I.L.D.*

10M–666 551.579.5:551.573(448.1/7

Damagnez, J., **Rôle du mulch naturel ou artificiel sur la dynamique et l'économie de l'eau dan le Languedoc méditerranéen.** [Part of natural or artificial mulch on the dynamics and economic of water in the Mediterranean Languedoc.] *Académie d'Agriculture de France, Paris, Compte rendus*, 45(6):237–241, March 11, **1959.** 1 fig., 2 tables, 2 refs. **DLC**—Movement of water toward surface within a soil subject to evaporation has tendency to go on, as long as the capillary films d not break asunder. Under conditions of intense evaporation, these films are broken and ther appears a dried up surface layer called natural mulch. The more climatic factors are likely to caus high evaporation, the more rapidly the mulch layer will be formed and the sooner losses in water c soil, through evaporation, will be limited. Author investigates the part played as "buffer" b natural mulch in the conditions of the mediterranean Languedoc, the effect of evaporation condition on the hydrous regime within a bare soil, and the evaporation regime and distribution of losses i water at various depths in the soil. The influence of natural mulch on the decrease of losses in wate within the soil, and that of a straw-cover on the hydrous regime of soil, are determined. Straw mulch at the same time limits the thermal amplitude at the surface of soil, and reduces the intensit of the water vapor exchange between soil and atmosphere. *Subject Headings:* **1. Soil moistur movement 2. Soil moisture regime 3. Mulch 4. Evaporation from soil 5. Languedoc, France** —*A.V.*

10M–667 551.579.5:551.573:631.51(448.1/7

Damagnez, J., **Influence des façons superficielles estivales sur l'économie de l'eau d'un sol n dans le Languedoc méditerranéen.** [Influence of summer surface-dressing on economics of wate

thin a bare soil, in the Mediterranean Languedoc.] *Académie d'Agriculture de France, Paris, mptes rendus*, 45(6):241–246, March 11, **1959.** 1 fig., 1 table, 2 refs. **DLC**—In the Mediterranean nguedoc, where climate is characterized by dry and hot weather together with high evaporation, mpletion of the vegetative cycle occurs at the expense of the water reserves in the soil. Author vestigates experimentally the action of surface techniques (second dressing, scarifying) on losses water through evaporation. In the surface layer (0–10 cm), second dressing has no visible action the general economics of water. Within the layer between 7 and 10 cm, second dressing has, in position to what is generally admitted, an unfavorable effect on the economics of water. A dusty d dry surface layer obtained through a second dressing has, generally speaking, an action comrable to that resulting from a natural mulch. Second dressing has no action on the maintenance water reserves in the soil, but it augments porosity and thereby promotes penetration of water d aeration of soil. *Subject Headings:* **1. Soil moisture regime 2. Mulch 3. Languedoc, France.** *A.V.*

10M–668 551.579.5:631.67(778)

Decker, Wayne L. (*Climatologist Univ. of Missouri, Columbia, Mo.*), **Irrigation in Missouri.** *U. S. Weather Bureau, Weekly Weather and Crop Bulletin*, 44(20):8, May 20, **1957.** fig. **DWB**—ased on 67 years of weather data for Columbia, Mo., histograms are presented showing percentage years that a given number of irrigation treatments would have to be used during each month May–Sept.), to bring soil moisture above 50% of its capacity. It is shown that on only 6% of the 7 years would no irrigation be needed, and on 8 to 9 years out of 10 more than one treatment would ve been necessary. Need increases from June (1 year out of 4) to July (3 years out of 4), and ightly less for Aug., and 2 years out of 4 in Sept. *Subject Headings:* **1. Irrigation requirements Columbia, Mo.**—*M.R.*

10M–669 551.579.5:551.573

†Dixey, F. (*Director of Colonial Geological Surveys, London*), **Some recent studies in ground-water oblems.** *UNESCO, Arid Zone Programme*, No. 2:43–50, **1953.** 78 refs. **DWB**—Discusses praisal of water resources, hydrologic cycles, evapotranspiration and other problems more strictly the field of ground water. Water loss can sometimes be reduced by eliminating useless vegetation which increases evapotranspiration), or by control of type or rankness of growth. Problems of easurement of evaporative losses are still unsolved. *Subject Headings:* **1. Ground water studies Hydrologic cycles 3. Evapotranspiration losses.**—*M.R.*

10M–670 628 551.579.5

Dixey, F. (*Dir. British Colonial Geological Surveys*), **Subterranean water-supply investigation the British colonies.** *I.U.G.G. Association of Scientific Hydrology, Brussels, 1951*, [*Transactions*], ol. 4, pub. **1952.** p. 26–34. ref. **DWB**—General report on current investigations giving also me information on studies related to the hydrologic cycle and climatic changes. *Subject Headings:* **. Ground water research 2. Hydrologic cycle.**—*A.A.*

10M–671 551.579.5:631.46

Dommergues, Yvon, **L'activité de la microflore tellurique aux faibles humidités.** [Activity of elluric microflora at low humidities.] *Académie des Sciences, Paris, Comptes-Rendus*, 248(3):487–90, Jan. 19, **1959.** 2 tables. **DWB, DLC**—Study carried out in order to determine the ecological haracteristics of microflora in the zone of low humidities. Within the soil, the minimum rate of oisture required for the starting of biological activity is situated below the withering point for ellulolytic, amylotic and glycolytic germs. The process of immobilizing or mineralizing organic ubstances in the soil may occur at humidities avowedly lower than those required for the growth f higher plants. These processes themselves necessitate minimum humidities sufficiently different o that accumulations of certain intermediate substances appear in the soil. The enrichment of soil n nitrates during the rainless season can be explained for countries where this season is sufficiently rolonged. *Subject Headings:* **1. Microbiology of soils 2. Soil microflora 3. Soil moisture.**—*A.V.*

10M–672 551.579.5:551.577(775)

*Drescher, William J., **Some effects of precipitation on ground water in Wisconsin.** *Wisconsin. eological Survey, Information Circular*, No. **1, 1955.** 17 p. 5 refs., 5 figs. **DWB**—The general ffects of soil, geology, vegetation, etc. on the hydrologic cycle and water supply are examined. Examples of relations between short seasonal and long-term, or cumulative, variations in precipitaion, snow cover, soil freezing temperature and water supply in the ground, etc., in Central Wisconsin re discussed and graphed. Both shallow unconfined aquifers and artesian aquifers are considered. *Subject Headings:* **1. Ground water-precipitation relationships 2. Ground water variations 3. Central Wisconsin. I. Wisconsin, Univ.**—*M.R.*

10M–673 551.579.5(

Eggelsmann, Rudolf (*Bremen*), **Zur Kenntnis der Zusammenhänge zwischen Bodenfeuchte u oberflächennahem Grundwasser.** [Relation between soil moisture and ground water near t surface.] *Die Wasserwirtschaft*, Stuttgart, 47(11):283–287, Aug. **1957.** 9 figs., 2 tables, 14 re **DLC**—An excellent correlation (~0.9) was found between the soil moisture reserve and the hei of the ground water in a bay. The ground water, however, was a significant part of the total me ured soil moisture. For deeper ground water (loam) the relation was not so good. Freque statistics and soil profiles are shown. *Subject Headings:* **1. Soil moisture—ground water relationsh 2. Ground water levels 3. Königsmoor, Germany.**—*A.A.*

10M–674 551.579

Felitsiant, I. N., **Opyt issledovaniia kapilliarnogo peredvizheniia vlagi v sloistykh gruntakh.** contribution to the study of capillary movement of moisture in stratified ground.] *Pochvoveden* Moscow, No. 3:22–33, March **1959.** 4 figs., 7 tables, 7 refs. English summary p. 33. **DL** Transl. into English in corresponding issue of *Soviet Soil Science*, Wash., D. C.—Laboratory expe ments have revealed that 1) the rate and height of capillary rise of moisture in stratified ground, in homogeneous ground, depend upon: a) the correlation between the stimulating (meniscus force and impeding (weight of water column and friction) forces and hence upon the texture of the alterna ing layers, their thickness and reciprocal position in the ground; b) the correlation, at different heigh between the intake of capillary moisture and its expenditure (bound water and evaporatio 2) In stratified ground capillary movement of water does not decrease as smoothly with height as does in homogeneous ground. The curves of capillary rise exhibit breaks at the boundaries betwe the layers. In natural grounds with a texture becoming heavier from one layer to another in upward direction there occur temporary hindrances of water movement which are the greater, t greater is the difference in texture of the alternating layers and the farther the boundary from t surface of free water. *Subject Heading:* **1. Soil moisture movement.**—*Author's abstract.*

10M–675 551.579.5:634.

Gorokhov, M. I., **Vliianie lesnykh nasazhdenii na prosachivanie atmosfernykh osadkov pochvu.** [The influence of forests on percolation of atmospheric precipitation in soil.] *Les i Ste* Moscow, 10:86–88, **1951.** 2 tables. **DLC**—Results of lysimeter observations extended over years show amount and frequency of percolation for grass and forest cover and different soi separately for the whole year and the growing season only. *Subject Headings:* **1. Percolation 2. H drologic cycle 3. Forest influences 4. Moscow district, U.S.S.R.**—*A.A.*

10M–676 551.579.5:551.525:537.3

Grütz, W., **Vergleichende Bestimmung von osmotischen Druck mit Hilfe der Gefrierpunkterni derung und der elektrischen Leitfähigkeit in Bodenwasser.** [Comparative determination of osmot pressure with the help of the freezing point depression and the electric conductivity in ground water *Zeitschrift für Pflanzenernährung, Düngung und Bodenkunde*, Weinheim, Germany, 81(2):148–15 **1958.** 2 tables, 3 refs. **DLC**—The author gives a detailed definition of the osmotic pressure ground water. Factors are given to calculate the osmotic pressure with respect to the conductivity After comparison of the measurements of the freezing point depression and of conductivity, it wa stated that estimation of osmotic pressure from conductivity values are possible in special case but are to be controlled with the help of the freezing point depression. *Subject Headings:* **1. Groun water 2. Osmotic pressure of ground water 3. Electric conductivity of ground water.**—*A.V.*

10M–677 551.579.5:551.52

Gurr, C. G.; Marshall, T. J. and Hutton, J. T. (*Commonwealth Sc. and Ind. Res. Organ., Adelaid S. Australia*), **Movement of water in soil due to a temperature gradient.** *Soil Science*, New Bruns wick, 74(5):335–345, Nov. **1952.** 4 figs., 2 tables, 17 refs. Abstracted from reprint. **DWB**—Th authors present additional experimental evidence for the movement of water in sealed soil column in the direction of high and low temperatures; salts move toward the hotter end. The maximum ne transfer of water occurred in soil with approximately one third of the moisture equivalent. Littl movement takes place in very wet or dry soils. *Subject Headings:* **1. Soil moisture movemen 2. Soil temperature.**—*A.A.*

10M–678 551.579.

Harrold, Lloyd Larren (*U. S. Soil Conservation Service*), **Use of soil porosity for water conserva tion.** *Agricultural Engineering*, 33(5):287–289, 292, May **1952.** 2 figs., 6 refs. **DLC**—The effe of surface condition of the soil on infiltration and water storage is discussed. Various methods increasing infiltration capacity and results obtained by their application are described. *Subje Headings:* **1. Soil porosity 2. Infiltration 3. Water retention.**—*G.T.*

10M–679 551.579.5

Harrold, Lloyd Larren (*Soil Conservation Service, U. S.*), **Infiltration as affected by surface sealing.** *I.U.G.G. Association of Scientific Hydrology, Brussels, 1951,* [*Transactions*], Vol. 3, pub. 1952. p. 316–320. table, 4 figs., 4 refs. **DWB**—Infiltration curves were derived from observations of storm rainfall and runoff from 1 acre catchment areas at Coshocton, Ohio according to the methods of Holten, Schiff and Dreibelbis. Some data are given to show the effect of raindrop action on soil structure deterioration. *Subject Headings:* **1. Infiltration 2. Soil erosion 3. Coshocton, Ohio.**—*A.A.*

10M–680 551.579.5:631.92

Harrold, Lloyd Larren, **Effect of vegetation on soil moisture.** *American Society of Agricultural Engineers, Transactions,* 1(1):6–8, 11, **1958.** 2 figs., 4 tables, 4 refs. **DWB**—A discussion on the consumptive use of water by vegetation in the humid region is given, outlining how water, that is removed from the soil, is a factor in the hydrology of floods, in soil dryness, in its bearing strength, and in recharge to ground water. The article discusses how vegetation and land surface conditions are also affected, thus calling into play various irrigation programs. *Subject Headings:* **1. Soil moisture 2. Vegetation influences.**—*N.N.*

10M–681 551.579.5

John, P. T. and Badgley, F. I. (*both, Meteorology Dept. University of Washington*), **Movement of waters in soils (summary).** (In: Washington State College, **Proceedings of the WSC Hydraulics Conference, Oct. 1957, Pullman, Wash.,** pub. **1957.** p. 225–226.) **DWB**—A summary of an experiment on the vapor pressure in soil is given. The soil at all levels was analyzed for moisture percentage. The upward and downward motion of the wet fronts that kept the wet fronts at different humidities was also studied. The conclusion was that water moves in the soil above the capillary head up to the wet front both as liquid and as vapor. Details of the results are listed. *Subject Headings:* **1. Soil moisture movement 2. Vapor pressure in soil.**—*N.N.*

10M–682 551.579.5:551.525.5

Jumikis, Alfreds R. (*Civil Eng., Rutgers Univ., New Brunswick, N. J.*), **Soil moisture transfer in the vapor phase upon freezing.** *National Research Council. Highway Research Board, Bulletin,* No. 168:96–116, **1957.** 14 figs., 3 tables, 14 refs., 42 eqs. **DWB**—In this study the validity of the assumption serving as a basis for the soil freezing experiment is examined, namely, that the upward flow of soil moisture from ground water toward the freezing ice lenses takes place virtually unaccompanied by vapor diffusion. Two cases were studied: (1) upward diffusion of vapor to air (voids in soil not filled with water), and (2) upward diffusion of vapor through water (soil voids filled with water). The study reveals that upon freezing the amounts of soil moisture transferred in the vapor phase are small. Therefore the mechanism of vapor diffusion in the soil freezing experiment can be considered as being of little significance. *Subject Headings:* **1. Soil moisture movement 2. Soil freezing 3. Vapor transfer in soil.**—*Author's abstract.*

10M–683 551.579.5(567)

Khudairi, A. K. and Abdul Wahab, A. S. (*both, Dept. of Botany, College of Science, Univ. of Baghdad*), **On the soil moisture relations of soils from Southern Iraq.** *Iraqui Scientific Societies, Baghdad, Iraq, Proceedings,* 2:37–38, **1958.** table. **DWB**—The experiments concerning field capacities and permanent wilting percentages of Iraqi soils are reported. Hilgard pan method and another modified method were used to determine field capacity. Permanent wilting percentage was measured by observing actual plant response. It is concluded that mean field capacity of a heavy textured soil is about 40%, medium textured soil is 30%, and light textured soil is 20%. Permanent wilting percentages range from 15% for heavy textured soil, 10% for medium textured soil, and 3% for the light textured soils. *Subject Headings:* **1. Soil moisture 2. Iraq.**—*I.S.*

10M–684 551.579.5 626.862

Kirkham, Don, **Seepage of steady rainfall through soil into drains.** *American Geophysical Union, Transactions,* 39(5):892–908, Oct. **1958.** 4 figs., 2 tables, 8 refs., 102 eqs. **DWB, DLC**—Theoretical formulas for the height of all points of an arch-shaped water table are derived for steady rainfall seeping into homogeneous soil drained by tubes or ditches. The soil is underlain by an impermeable layer and the drains are taken to be equally spaced and equally deep. The solution is based on exact mathematical procedures, but utilizes a physical assumption that the height of the water table as measured from a reference plane passing through the lowest points of the water table is small compared to the depth of the impermeable layer. For tube drains running half full and when the impermeable layer is at great depth, the theoretical height H of the water table midway between drain tubes takes the particularly simple form, $H = (2sR/\pi k) \ln (2s/\pi r)$, where H is height

above the reference plane, $2r$ is the diameter of the drain tube, $2s$ is the spacing between drain tube R is the rainfall rate, and k the hydraulic conductivity. Flow nets for tube and ditch drainage a presented; a table for making practical computations has been prepared. The theory is compare with field data of KIRKHAM and DEZEEUW; good agreement was obtained. Finally, the interestin point is brought out that the Dupuit-Forchheimer (DF) theory emerges from the general theor for the special case of very large ratios of drain spacing to height of water saturated soil and for a essentially flat water table. Thus the analysis presents a rational foundation for DF theory whic has heretofore been lacking. *Subject Headings:* **1. Drainage 2. Percolation 3. Dupuit-Forch heimer theory.**—*Author's abstract.*

10M–685 551.579.5:551.525.

†Komarov, V. D., **Laboratornoe issledovanie vodopronitsaemosti merzloĭ pochvy.** [Laborator investigation of the water permeability of frozen soil.] *Moscow. Tsentral'nyĭ Institut Prognozov Trudy*, No. 54:3–42, **1957.** 16 figs., 25 tables, 46 refs. **DWB DLC**—The permeability of froze ground as influenced by different soil types and the ice content of the soil was investigated experi mentally especially from the thermal, physical aspects of the process. The physical propertie of the ice in frozen soil namely ice-cement which is crystallized ice in the soil pores, and ice inclusions such as veins, seams, etc., their formation, the migration of water in frozen soil and the quantitativ determination of the ice content of frozen ground are discussed with the aid of graphs, diagrams an an equation. This is followed by a detailed description of the apparatus and procedure of investiga tion, the permeability of frozen ground, the results of studies on the penetration of water into frozet sand, frozen podzol clayey soils and frozen chernozem soils. Thermal, physical processes play a fundamental role in the filtration of meltwater into frozen ground. During the penetration into the pores of frozen ground with negative temperatures the melt water freezes partially so that the pore may be filled completely with ice. Ice formation occurs owing to the "cold storage" of frozen ground and the phase transformation of bound water in the region of negative temperatures. Frozen ground can be characterized by varying magnitudes of the coefficient of filtration, more precisely by the distribution of the filtration coefficient with depth of the soil profile, and is impenetrable to melt water after the filtration of a relatively small layer of water or can become almost impenetrable from the outset. During penetration of frozen ground by water the dependence of intensity of absorption or of total amount of absorbed water upon time is found by the simultaneous solution of equations of motion and of water balance. An equation is presented expressing the dependence of the filtration coefficient of frozen ground on its ice content and temperature before the start of absorption. Both the temperature and ice content of soil influence the degree of its cementation. When frozen soil is penetrable then its surface forms an ice crust at the start of snow melt. An Appendix contains descriptions and data on soil temperature, air temperature in the laboratory, etc. and on the water absorption for each of 13 experiments conducted. *Subject Headings:* **1. Frozen soil permeability 2. Frozen soil 3. Soil freezing.**—*I.L.D.*

10M–686 551.579.5:551.577.37

*Krimgold, D. B., **Investigation of infiltration rates of soils and rainfall intensities.** *Johns Hopkins Univ. Laboratory of Climatology, Publications in Climatology*, 7(3):384–396, **1954.** 8 tables, 4 figs., 5 refs. **DWB**—Average infiltration rates are given for the first 15, 30, 60 min, and the second and third hour after beginning of rain. Rainfall intensities occurring at different rates are related to monthly rainfall and temperature for different localities. Surface runoff depending on the kind of soil can be computed from such relationships. *Subject Headings:* **1. Infiltration 2. Rainfall intensities 3. Surface runoff 4. United States.**—*A.A.*

10M–687 551.585.5:551.579.5:628.1

Leopold, Luna B. (*Chief Hydraulic Engineer, U. S. Geological Survey, Wash., D. C.*), **Water problems in the present trend toward greater aridity.** (In: California. Univ. Scripps Institution of Oceanography, **Proceedings [of the] Conference on Recent Research in Climatology March 1957.** Issued Univ. of California, [**1957?**]. p. 107–116.) **DLC, DWB** (M8 C153co)—The author speculates on the impact of irrigation practices, urbanization, ground-water depletion, etc., upon the decreasing water supply in the U. S. A trend toward warmer and more arid climate is stated to have existed since 1860 as part of a more general warming which began with the retreat of the last great continental glaciers. The author reports an analysis of long precipitation records in the SW United States which shows that during dry years the percentage of rainfall contributed by heavy rains is smaller than in wet years. This means that little water can infiltrate and the loss by evapotranspiration is larger, thus accentuating aridity. Methods of reducing water losses and possibilities of increasing rainfall by cloud seeding are discussed. *Subject Headings:* **1. Water supply 2. Ground water depletion 3. Aridity trends 4. United States.**—*G.T.*

10M–688 551.579.5

McIntyre, D. S. (*CSIRO, Australia*), **Permeability measurements of soil crusts formed by raindrop impact.** *Soil Science*, Baltimore, 85(4):185–189, April **1958.** 5 figs., 8 refs. **DLC**—A method was developed for the measurement of permeability of surface crusts, and permeability values were measured for two cultivated soils and a virgin soil, all of the one-soil type. Crusts were formed over small areas by simulated rainfall under two different conditions: a) soil splash lost from the surface, and b) 70–80 percent soil splash retained by the use of baffles. Thin sections were made from crusts formed on one of the cultivated soils and the make-up of the crust determined microscopically. In the two cases the crust consisted of a thin compact skin seal 0.1 mm thick over the surface and a washed-in layer where porosity had been reduced considerably. Permeabilities were, respectively, 5×10^{-7} cm/sec and 5×10^{-6} cm/sec. The washed-in layer was thicker when splash was retained (2.5 mm) than when splash was lost from the surface (1.5 mm). The underlying soil had a permeability of about 10^{-3} cm/sec. *Subject Headings:* **1. Soil permeability 2. Soil crusting by raindrops.**—*Author's abstract.*

10M–689 551.579.5

Musgrave, G. W. (*U. S.*), **Commission on underground waters infiltration.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Oslo, 1948*, [*Transactions*], Vol. 3, pub. [**1951**]. p. 25–30. 31 refs. **DWB**—Literature review on research work done in the U. S. from 1939–1948 in the fields of soil structure and permeability, erosion by raindrops, infiltration, surface runoff, etc. *Subject Headings:* **1. Infiltration research 2. United States.**—*A.A.*

10M–690 551.579.5:551.501

Person, M., **Über elektrische Messungen der Bodenfeuchte.** [Electrical measurements of soil moisture.] *Germany. Deutscher Wetterdienst in der U. S. Zone, Berichte*, 32:22–24, **1952.** 2 figs. **DWB**—The measurement of the soil moisture by means of gypsum blocks is not sufficiently exact. The author tries to determine the soil moisture by the measurement of the dielectric constant of the soil. Results depend on grain size. The apparatus used is relatively expensive. *Subject Heading:* **1. Soil moisture measurement.**—*A.A.*

10M–691 551.579.5:532.72

Philip, J. R. (*CSIRO, New South Wales, Australia*), **The concept of diffusion applied to soil water.** *National Academy of Sciences, Allahabad, India, Proceedings, Sec. A*, 24(1):83–104, **1955.** 2 figs., 24 refs., eqs.—The development of the diffusion concept as applied to soil moisture movement is briefly reviewed. It is shown that the general differential equation describing isothermal liquid phase movement in a porous medium can be modified to include movement in the vapor and adsorbed phases as well, without complicating the mathematical form. A concentration-dependent diffusivity is derived which refers to movement in all three phases. The significance and limitations of this equation in the study of hydrologic phenomena are discussed. A derivation of the surface diffusivity of the absorbed phase for a highly idealized model is given in an appendix. *Subject Heading:* **1. Soil moisture diffusion.**—*Author's abstract.*

10M–692 551.579.5:551.579

Poliakov, B. V., **Opredelenie sviazi mezhdu podzemnymi vodami i poverkhostnym stokom.** [Determination of the relationship between underground waters and surface runoff.] *Leningrad. Tsentral'nyĭ Institut Prognozov, Trudy*, 2(29):64–112, **1947.** 16 figs. (incl. photos), 8 tables, 38 refs., eqs. **DLC**—It is shown that this relationship can best be determined by evaluating the underground supply by means of a genetic analysis of the mean low level hydrograph (preferably of small, non-regulated rivers, for several consecutive years) of a river. The regulation of the mean low level river discharge by surface reservoirs, (influence of lakes, reservoirs, swamps and river bed regulation); subterranean supply of water and methods of determining it; (influence of various factors, such as geology, subterranean drainage areas, karst, soil permeability, sandy and forest soil, and agriculture); the active humidity of soils as the source of ground and transpiration moisture; and causes of low underground supply of rivers (permafrost, total freezing or drying out of rivers) are discussed. A quantative characterization of underground supply is given, in which the author introduces his method of calculating this supply by means of the ratio $K = m_0\,100/M_0$ representing the ratio M of the minimum modulus of discharge to the normal modulus M_0, expressed in percent. Isolines of the parameter K are plotted on a map of the northern slopes of the Caucasus Mountains. The underground recharge of rivers in European U.S.S.R. is described by regions. *Subject Headings:* **1. Underground water 2. Surface runoff 3. River discharge control 4. Caucasus Mountains U.S.S.R.**—*A.M.P.*

10M–693 551.501.5:551.579.5:532.5

Pol'skiĭ, M. N., **Sposoby obrabotki izobrazheniia i analiza dannykh po dinamike vlazhnosti pochvy.** [Methods of representing and analyzing data on soil-moisture dynamics.] *Pochvovedenie*,

Moscow, No. 11:72–82, Nov. **1958.** 5 figs., 18 refs. English summary, p. 82. **DLC.** Transl into English in corresponding issue of *Soviet Soil Science*, Wash., D. C.—The author presents th results of two principal methods for representing and analyzing data on soil moisture dynamics the methods of curves and of isopleths. A series of illustrations of the application of these method to dark colored soil formed on a forest type clay under virgin cereal grass, is presented. Curve illustrate the distribution of moisture (in percent of dry weight of soil) in the soil at a given momen and a series of curves illustrate the dynamics of moisture. But moisture "by weight" does no properly indicate the degree of water saturation of the soil profile having a varying water retention capacity at different horizons. Moisture was characterized, therefore, by relative magnitudes in percent of total moisture capacity, capillary moisture capacity and minimum moisture capacity For the latter, the method of isopleths was developed. A new form of the isopleth method, capable of representing the quality of soil moisture, namely melting moisture, maximum hygroscopicity was developed by drawing isopleths of moisture in percent of weight upon soil layers of different categories The method of isopleths is known in three forms; chromoisopleths of weighted moisture; of relative weighed moisture and of weighed moisture with capillary categories of moisture. The moisture regime in the soil must be described, not only in percent of weight but also in percent of total volume of soil, which is more suitable, since, being determined for the 10 cm layer, it is numerically equa to the reserve of water in these layers expressed in millimeters of water layer. The difference between the profile of moisture in percent of weight and in percent of volume is the result of density variations along the soil profile. The moisture available during maximum moisture capacity is distributed chiefly between microaggregates and mechanical elements of forest type structural fractions (fractions similar in size to the microaggregates and mechanical elements). The moisture corresponding to melting moisture is adopted to the microaggregate pores of these fractions. Physically, the range of active moisture corresponds to a "water body" bounded by the surface of forest type particles and by a complex system of meniscuses and associated films. Also the profile distribution of free and available moisture for plants is discussed with the aid of curves and isopleths. *Subject Headings:* **1. Soil moisture dynamics 2. Soil moisture analysis 3. Isopleths.**—*I.L.D.*

10M–694 631.43:536.63:551.579.5

Portman, Donald J. (*Univ. of Mich., Ann Arbor*), **Soil density water content and heat capacity—Johns Hopkins University.** (In: Lettau, H. H. and Davidson, Ben. (*eds.*), **Exploring the atmosphere's first mile.** N. Y. Pergamon Press, **1957.** Vol. 1, p. 41–45. 2 figs., 2 tables, 3 refs., 2 eqs.) **DWB**—In connection with the measurements of soil density, water content and heat capacity made at the Johns Hopkins University site at O'Neill, Nebraska, the author discusses the methods employed to measure specific heat, namely its indirect measurement with the aid of equation: $C = C_w + C_d(1-w)$, where C, C_w and C_d (cal g^{-1} deg^{-1}) are the specific heat of moist soil, water and dry soil, respectively, and W is the fraction of water by weight in moist soil; soil density by means of equation: $\rho = \rho_d(1-W)$; and heat capacity using the computed specific heats and bulk densities. Tables giving specific heats of various soils (dry state) and estimated soil heat capacity at O'Neill, Nebraska, and graphs showing soil moisture and rainfall at O'Neill, Nebraska (1953) and dry density of soil at the same site are presented. *Subject Headings:* **1. Specific heat of soil 2. Soil moisture 3. Soil density.**—*I.L.D.*

10M–695 551.579.5:551.571(54)

*Ramdas, L. A. and Katti, M. S., **Studies on soil-moisture in relation to moisture in the surface layers of the atmosphere during the clear season at Poona.** *Indian Journal of Agricultural Science*, New Delhi, 6(6):1163–1200, **1936.** 10 figs., 22 tables, refs. **DA, DWB** (M:63 R169a)—Extensive analysis of data, obtained in the laboratory and in the field at Poona, to determine the diurnal variation of evaporation and soil moisture for 4 types of soil. Observations were made every 2 hours from 0600 May 23 to 0600 June 2, 1934, during which time skies were clear but a sea breeze prevailed at night. Vapor pressure is greater during the sea breeze, and it increases with height at night and decreases with height in the daytime. On Jan. 23, 1935, soil samples from 8 parts of India were studied with the same end in view. Great variation exists between soils with respect to the diurnal variation. The paper is replete with graphs and tables. *Subject Headings:* **1. Soil moisture variations 2. Poona, India.**—*M.R.*

10M–696 551.579.5:551.524.36

Rao, K. Subba and Wadhawan, S. K. (*National Phys. Lab., New Delhi*), **Soil permeability.** *Current Science*, 21(4):100–101, April **1952.** fig., 5 refs. **DLC**—Soil samples from the Ganges Delta were dehydrated at different temperatures, 60°C to 1000°C, and tested for permeability after cooling to 30°C. It was found that soil dehydrated at 60°C decreased in permeability because of shrinkage. Dehydration at temperatures >650°C also decreased permeability by producing a decrease in porosity. However, between 60°C and 650°C the permeability was increased because of aggregation

of small soil particles into bigger aggregates. *Subject Headings:* **1. Soil permeability 2. Temperature effects.**—*M.R.*

10M–697 551.579.1:551.579.5:551.48/49

Rochefort, Michel, and Tricart, Jean, **Rôle de l'écoulement subsuperficiel dans l'alimentation de certains cours d'eau.** [The part of subsurface runoff in the recharge of certain rivers.] *Académie des Sciences, Paris, Comptes Rendus*, 248(2):267–270, Jan. 12, **1959.** 2 refs. **DWB, DLC**—The difference between surface runoff and underground runoff at small depths within soils or at their base is discussed. Subsurface runoff differs from surface runoff, both from the hydrological and geomorphological points of view. Subsurface runoff lags somewhat behind runoff at the surface. This distinction explains the disymmetry in flood peaks. Runoff scrapes and hollows out the ground, securing progressively a drainage of the waters falling on its surface. Subsurface runoff, on the other hand, can saturate the discontinuity surfaces between the soil and original rock. *Subject Headings:* **1. Subsurface runoff 2. Surface runoff.**—*A.V.*

10M–698 551.579.5(47)

Rode, A. A., **Rezhim pochvenno-gruntovykh vod podzolistykh podzolisto-bolotnykh i bolotnykh pochv.** [The regime of the soil and ground water in podzolic, podzolic-swampy and swampy soils.] *Akademiia Nauk SSSR. Pochvennyĭ Institut, Trudy*, 32:5–73, **1950.** 21 figs., 9 tables, 11 refs. **DLC**—This account of ground water conditions during watershed experiments extended over 4 years in the Central Forest Park near Velikie Luki gives also meteorological data and shows the dependence of the ground water fluctuations on precipitation, snow cover, temperature and atmospheric pressure. *Subject Headings:* **1. Ground water variations 2. Velikie Luki U.S.S.R.**—*A.A.*

10M–699 551.579.5

Rode, A. A., **K voprosu o prirode sil uderzhivaiushchikh v pochve "kapilliarno-podveshennuiu" vlagu.** [The nature of the retentivity of "capillary-suspended" moisture in the soil.] *Akademiia Nauk SSSR. Pochvennyĭ Institut, Trudy*, 32:397–406, **1950.** fig., 3 tables, 8 refs. **DLC**—Presenting moisture capacity data for loess soils, the author comes to the conclusion that the moisture retention in loam soils is caused by a moisture film around the particles, while capillary forces are responsible for the moisture retention in sandy soils. *Subject Heading:* **1. Soil moisture retention.**—*A.A.*

10M–700 551.579.5:627.51

Scott, Harold A. (*Chief, Planning and Reports Branch, Corps of Engineers, Jacksonville, Fla.*), **Water control in central and southern Florida.** *American Society of Civil Engineers, Proceedings*, Vol. 80, Separate, No. 521, Oct. **1954.** 20 p. 9 plates, 12 tables. **DWB**—This paper describes the historical efforts made to provide drainage and water control for central and southern Florida. Distribution and utilization of water in the Comprehensive Plan for flood control and multiple purposes are described. The need for a secondary water control plan is emphasized. *Subject Headings:* **1. Flood control 2. Drainage 3. Florida.**—*Author's abstract.*

10M–701 551.579.5:631.61

Scott, V. H. (*Dept. of Irrigation, Univ. Calif.*), **Relative infiltration rates of burned and unburned upland soils.** *American Geophysical Union, Transactions*, 37(1):67–69, Feb. **1956.** table, 12 refs. **DWB, DLC**—To increase the value of range land densely covered by brush, a number of management practices are being employed. One practice, clearing by the use of fire, has raised the question as to its effect on the infiltration capacity of the soil. Application of single-ring infiltrometers for determining relative infiltration rates of upland soils is discussed. Values of the relative infiltration rates for burned and unburned areas in California are presented. In all cases the burned soils had substantially higher rates following a fire. One year later the results were similar with one exception. *Subject Heading:* **1. Soil permeability.**—*Author's abstract.*

10M–702 631.62:551.579.5

Sine, L. and Meinguet, J., **Contribution à l'étude hydraulique des nappes de drainage.** [Contribution to the hydraulic study of drainage sheets.] *Gembloux, Belgium. Institut Agronomique de l'Etat, Bulletin de l'Institut et des Stations de Recherches*, 26(1–3):208–234, **1958.** 13 figs., 24 refs., 40 eqs.—One of the fundamental problems in elaborating a draining project is the determination of the clearance between drains as dependent on the hydrodynamic features of soils. The authors try to find an accurate numerical law relating to the movements of draining sheets. The results to date and research conducted to obtain a numerical solution to the problem of the formation of drainage sheets under permanent regime conditions are discussed. The analysis of the permanent regime of horizontal sheets allows specification of the speeds of downward motion in the middle of drain tiles. The study of flow variations is examined and it is explained how the problem may be solved when utilizing electronic computers. *Subject Headings:* **1. Drainage 2. Hydrodynamics of soils.**—*A.V.*

10M–703 551.501.9:551.579.5

Sinel'shchikov, V. V., **Uluchshit' nabluideniia nad vlazhnost'iu pochvy.** [Improving soil moisture observations.] *Meteorologiia i Gidrologiia*, No. 6:44–47, June **1956. DWB, DLC**—During the period 1951–55 the number of soil moisture measuring stations increased 1.5 fold so that by 1955 they numbered about 1000. This increase in number occurred particularly in the regions of the virgin lands which are beginning to be cultivated. In subsequent years it is proposed to extend observational networks in the Kazakh S.S.R. and in W. Siberia, in particular soil moisture observations, the use of soil moisture data in agrometeorological forecasts, methods for determining soil moisture, etc. *Subject Headings:* **1. Soil moisture measurement networks 2. Soil moisture research 3. U.S.S.R.**—*I.L.D.*

10M–704 778.3:551.501:551.579.5

Sivadjian, Joseph, **Quelques applications récentes de l'hygrophotographie.** [Some recent applications of hygrophotography.] *La Nature*, Paris, No. 3291:312–314, July **1959.** 8 figs. **DLC**—Hygrophotographic emulsion is immediately sensitive to light and, afterwards, to humidity and water. This sensitiveness to water, of plates previously subjected to the action of light, can be applied in various fields and particularly to the measurement of soil moisture. The use of hydrophotographic plates makes it possible to investigate moisture distribution and the hydrous profiles of soils. *Subject Headings:* **1. Soil moisture determination 2. Hygrophotographic plates.**—*A.V.*

10M–705 551.579.5:551.501

Stallman, Robert W. (*U. S. Geologic Survey, Wash., D. C.*), **Discussion of Leonard Schiff: The effect of surface head on infiltration rates based on the performance of ring infiltrometers and ponds.** *American Geophysical Union, Transactions*, 35(1):171–174, Feb. **1954.** 4 refs., 10 eqs. **DLC**—An attempt is made to reach a more quantitative basis for determining infiltration rates, than was evident in the paper by SCHIFF, which is discussed. Theory is developed for isotropic and homogeneous soils. SCHIFF in his final reply admits the improvement which STALLMAN suggested would be useful in developing a quantitative analysis of infiltrometer data. Field procedures still must be worked out in more detail, he says. *Subject Heading:* **1. Soil moisture calculations.**—*M.R.*

10M–706 551.508.79:551.579.5

Suarez de Castro, Fernando and Rodrigue G., Alvaro, **Estudio en lisimetros monolíticos del movimiento del agua en el suelo.** [Study in monolithic lysimeters of the movement of water in the soil.] *Federacion National de Cafeteros de Colombia, Boletín Técnico*, 2(19), **1958.** 18 p. fig., 11 tables, 18 refs., eqs. **PAU**—The author's attempt to determine the quantity of rain water lost by evapotranspiration from plants, by evaporation from the soil surface and by percolation into the soil in order to shed light on the hydrological cycle of the coffee soils of Colombia. The method involves the use of lysimeters with cylindrical monoliths of soil one meter in diameter and one meter in depth. The runoff was found to be greater for degraded soils and less for those with mulch, and still less for those with a living plant cover. The losses by percolation showed a similar behavior. The amount of water of percolation was directly proportional to rainfall. Evapotranspiration losses exceeded evaporation losses. Soil moisture under plant cover exceeded that of denuded soils. Losses of nutritive elements were greater by percolation than by runoff. The cation losses in descending order were calcium, magnesium and potassium. Of the anions, nitrates alone were lost in large quantities. Tables giving rainfall data for the 5 year period studied, water losses by runoff and percolation, percentage of available moisture in the soil, etc. are presented. *Subject Headings:* **1. Lysimeter studies 2. Water motion in the soil 3. Evapotranspiration 4. Soil moisture.** —*I.L.D.*

10M–707 551.579.5

Thorne, M. D. and Raney, W. A., **Soil moisture evaluation.** *U. S. Dept. of Agriculture. Agricultural Research Service, ARS* 41-6, May **1956.** 10 p. 2 figs., 3 tables, 8 refs. **DWB** (M79.5 T511s)—Various methods of soil moisture measurement are reviewed, including tensiometer measurement, gravimetric procedures, inert absorbers and electrical instruments. Moisture characteristic curves for clay, loam and sand are presented, relating soil moisture content to soil moisture tension, which is the most important factor from the point of view of plant nutrition. *Subject Headings:* **1. Soil moisture measurement 2. Soil moisture tension.**—*G.T.*

10M–708 551.582.3(73):551.579.5

Thornthwaite, C. W., **Soil moisture maps.** Drexel Institute of Technology. Laboratory of Climatology, Contract AF 19(604)-1410, Final Report, Sept. 30, **1957.** 8 p. table, 3 refs. **DWB**—Contract AF 19(604)-1410 began in May 1955 and terminated at the end of August 1957 when funds for its anticipated extension were not available. The purpose of this research study was to investigate the significance of moisture in the tractionability of soils and to present maps of the state

of the ground in various strategic areas by months. The abrupt ending of the contract stopped the preparation of maps and descriptive texts before the program had reached its full potential. Only two sets of monthly maps have been drawn and printed; but, four additional sets of monthly soil tractionability maps are in various stages of completion and all were scheduled for printing at the Aeronautical Chart and Information Center, St. Louis, before June 30, 1958. Three scientific reports have been issued under the contract. *Subject Headings:* **1. Soil moisture maps 2. United States.**—*Author's abstract.*

10M–709 551.579.5:631.43(689)

Tillett, E. R. and Saunder, D. H., **Soil moisture relationships of some Rhodesian soils.** *Rhodesia Agricultural Journal*, Salisbury, 56(2):61–64, March/April **1959.** 2 figs., 3 tables, 5 refs. **DLC, DA**—Data obtained for soil moisture constants on some Rhodesian soils are given with special reference to field capacity and wilting point. *Subject Headings:* **1. Soil moisture 2. Rhodesia.** —*A.V.*

10M–710 551.579.5(611)

Tixeront, J. (*Chief of Hydraulic Service, of French Direction des Travaux Publics*) and Berkaloff, E. (*French Direction des Travaux Publics*), **Note sur la percolation profonde des précipitations d'eau dans les massifs calcaires en Tunisie.** [Deep penetration of precipitation into the limestone massives in Tunisia.] *I.U.G.G. Association of Scientific Hydrology, Oslo, 1948,* [*Transactions*], Vol. 3, pub. [**1950**]. p. 31–39. 4 figs., 4 refs. **DWB**—An intelligent proposal, how to deal with the water balance problem in cases when deep percolation is present. The method is based on a bookkeeping procedure, taking into account accumulated precipitation, maximum moisture retained in the soil and evaporability (measured in this case by Piché evaporimeters). The authors show how to compute from hydrographs the effective catchment area, the soil moisture capacity (60–120 mm) and the reduction factor for evaporation. Results are presented for Djebel Chennata and Zaghonan and the massiv of Bent Saidane. *Subject Headings:* **1. Hydrologic cycle 2. Percolation 3. Soil moisture 4. Evaporation 5. Tunisia.**—*A.A.*

10M–711 551.579.5

Tschapek, M., **Concerning the forces of water retention by soils.** *Die Naturwissenschaften*, Berlin, 46(2):71–72, Jan. **1959.** 2 figs., 3 refs. **DLC**—Recently the application of thermodynamic methods used to investigate soil water retention has led to the unexpected conclusion that adsorptional forces are dominant up to field capacity (*FC*) and/or moisture equivalent (*ME*), relative humidity which $\approx 0.9997^{1-3}$. The author gives several examples which show that this conclusion should be reexamined. Absence of proportionality between *ME* and surface areas of sand and clay demonstrates that *ME* (or *FC*) cannot be explained completely by adsorptional forces. Experiments show that the predominant forces of water retention at *ME* or *FC* in kaolin should be capillary forces. *Subject Heading:* **1. Soil moisture retention.**—*A.V.*

10M–712 551.579.5(43–15)

Uhlig, S., **Die Bodenfeuchte in der Bundesrepublik im Abflussjahr 1955.** [Soil moisture in the Federal Republic in the 1955 hydrological year.] *Die Wasserwirtschaft*, Stuttgart, 46(11):289–290, Aug. **1956.** fig. **DLC**—Graphs show march of soil moisture at 10–20 cm depth at 5 stations in the Bundes Republic for 1955, compared with normal. An extensive discussion accompanies the diagrams. *Subject Headings:* **1. Soil moisture 2. West Germany.**—*M.R.*

10M–713 551.579.5:551.501

van Bavel, C. H. M. and Gilbert, M. J. (*Agronomy Dept., N. Carolina St. College, Raleigh, N. C.*), **Discussion of Nedavia Bethlahmy: A method for approximating the water content of soils.** *American Geophysical Union, Transactions*, 35(1):168–171, Feb. **1954.** 2 tables. **DLC**—VAN BAVEL and GILBERT raise the question of whether or not the soil moisture measurements indicated by a fiberglass soil moisture unit at a given depth, can be considered as reliable estimates of the moisture content of an area at that depth, which could be used for hydrologic calculations. BETHLAHMY replies that one element could not give a reliable estimate, but that several in an area could be considered sufficient for a reliable estimate just as well as any estimate based on sampling can be considered reliable. (*See* item 5.1–253, Jan. 1945, *MAB.*) *Subject Headings:* **1. Soil moisture measurements. I. Bethlahmy Nedavia.**—*M.R.*

10M–714 551.579.4/5:551.577

Wesseling, J., **The relation between rainfall drain discharge and depth of the water table in tile-drained land.** *Netherlands Journal of Agricultural Science*, Wageningen, 6(1):47–60, Feb. **1958.** 11 figs., 6 tables, 12 refs., 13 eqs. **DLC**—A description is given of a recording drain gage and a

ground water level recorder. With these devices measurements were taken at three field sites where the soil was light clay. Ground water levels were recorded midway between tile lines. The shape of the ground water table perpendicular and parallel to tile lines was determined by means of water table measurements in water gage tubes. A comparison was made between the actual storage capacity of the soil and the storage according to the moisture sorption curve of the soil. Generally the first is one-half to two-thirds of the latter value, this being due to entrapped air. A certain time-lag was observed between the moment that rainfall starts and the drains begin to run. The same also applies to the rise in the water table. The relationship between the height of the water table and the drain discharge is very variable when the water table is rising, but when it is falling, a good relationship was found. When the water table is shallow the actual discharge is much greater than the theoretical value owing to the greater permeability of the upper layers of the soil. If drain outlets are situated below ditch-water level the runoff is considerably retarded. A method is given for calculating the minimum depth of the water table that may be expected. *Subject Headings:* **1. Rainfall-effects 2. Ground water oscillations 3. Drain discharge.**—*Author's abstract.*

10M–715 551.579.5(47)

Zheltaia, N. N., **Vesennee promachivanie pochby kak pokazatel' vlagozapasov.** [Spring soaking of the soil as an index of moisture reserves.] *Meteorologiia i Gidrologiia*, Leningrad, No. 7:35–38, July **1958.** 2 figs., table, 3 refs., 6 eqs. **DWB, DLC**—The author attempts to determine the relationship between the depth of spring wetting of the soil and the corresponding soil moisture reserves in the wetted and inactive soil layers. Data obtained on depth of soil wetting and soil moisture during the period 1951–1957 on different types of microrelief of a complex plain in the north-west pri-Caspian depression were used. The microrelief was characterized by slight elevations and by solonchak soil, a non-permeable soil type whose wetting does not exceed the lower margin of the solonchak soil. A correlation was established between the depth of spring wetting and the general moisture content and the inactive layer of the soil. This relationship was similar in all types of microrelief. The correlation coefficient was 0.99 ± 0.003 and the regression equation between depth of wetting and total moisture content in the wetted layer is given by $y = 3.04x + 0.5$, $n = 105$ and $\sigma = \pm 8.3$. (x = depth of wetting ranging from 10 to 150 cm, n = number of cases and σ = mean square error of regression equation). The relation between depth of wetting and moisture content in the inactive soil layer is given by $y = 1.48x + 164$, $n = 8.8$, $\sigma = \pm 63$. These relationships were verified on the basis of data for the Ukraine, Northern Caucasus, and Rostov and Stalingrad Oblast, and the results are presented on graphs. Similar equations relating soil moisture content and wetting for soil on slopes of small elevation and depressions are presented. *Subject Headings:* **1. Percolation 2. Soil moisture reserves 3. U.S.S.R.**—*I.L.D.*

10M–716 551.579.5:631.4

Zonn, S. V., **O vzaimodeĭstvii pochvy i vody.** [Interaction of soil and water.] *Priroda*, Moscow, 43(8):121–122, Aug. **1954. DLC**—The book by A. A. Rode, **Pochuennaia vlaga** [Soil moisture], pub. 1952, is reviewed. All questions dealt with in the 9 chapters of the 160 page book and the conclusions drawn are based on field and laboratory experiments carried out on a large number of soils of different origin. The author (of the book) does not adhere to any of the two existing theories explaining retention and movement of water—the molecular and capillary—but takes into consideration the properties and structure, the mechanics and composition of soils. The author has also given attention to the reaction of plants to soils with different moisture contents. The few shortcomings enumerated in the review do not lessen the value of the book. (For abstract on the book *see* 10C–97, March 1959, *Met. Abs.*) *Subject Headings:* **1. Soil moisture 2. Soil structure.**—*A.M.P.*

GROUND WATER (551.579.5)

10M–717 551.579.5:551.491

Hendricks, E. L. (*U. S. Geological Survey, Atlanta, Ga.*), **Some notes on the relation of ground-water levels to pond levels in limestone sinks of southwestern Georgia.** *American Geophysical Union, Transactions*, 35(5):796–804, Oct. **1954.** 8 figs., 2 refs. **DWB**—Records of water levels in limesink ponds in southwestern Georgia and of water-table levels in the vicinity of these ponds are used to demonstrate: (1) some ponds with highly impermeable beds are virtually unaffected by water-table levels, except when water-table levels are above the rim of the impervious materials; (2) interchange of water between pond and water table occurs when beds are relatively permeable. Three phases in the relation between pond level and water-table level are recognized; (1) water-table level higher than pond level causing ground water flow into the pond; (2) ground-water level below pond level but in direct contact with it and measurably controlling rate of seepage from the pond; (3) ground water level below pond level but not in direct contract with it and not appreciably con-

trolling rate of seepage from the pond. In phase (3) the water table has a preceptible mound at a point underneath the pond. *Subject Headings:* **1. Water table 2. Pond levels 3. Ground water circulation.**—*Author's abstract.*

10M–718 551.579.5(62)

Hellström, B. (*Royal Institute of Technology, Stockholm*), **The ground water supply of northeastern Sinai.** *Geografiska Annaler*, Stockholm, 35(2):61–74, **1953.** 15 figs., 6 refs. **DWB**—Survey of rainfall conditions reveals an unusual amount of 13 to 97 mm with a number of rainy days from 2 to 17, diminishing from the Mediterranean coast towards the south. The ground water supplies are not exhausted by the present population. *Subject Headings:* **1. Ground water 2. Rainfall 3. Desert regions 4. Sinai Peninsula Egypt.**—*A.A.*

10M–719 551.579.5(491.1)

Hjulström, Filip, **The ground water.** (Ch. 9 of Pt. 2 of Hjulström, Filip; Sundborg, Åke; Arnborg, Lennart and Jónsson, Jón: **The Hoffellssandur: a glacial outwash plain.**) *Geografiska Annaler*, Stockholm, 37(3/4):234–245, **1955.** 7 figs., 3 tables. **DLC**—The author describes the ground water and hydrographic pattern of the largest sandur (Hoffellssandur) district in Iceland, including ground water characteristics, etc., ground water streams and the clear water rivulets; the manner of appearance of ground water, and the measurement of ground water, including a discussion of methods and data on ground water table. *Subject Headings:* **1. Ground water 2. Hoffellssandur Iceland.**—*I.L.D.*

10M–720 551.579.5(439.1)

Honti, Gyula, **A Szigetköz Talajuvízviszonyainak vizsgálata.** [Investigation of ground water conditions in Szigetköz.] *Hungary. Vízgazdálkodási Tudomanyos Kutató Intézet, Beszámolo . . . évi Munkássagárol*, 1954:122–134, pub. **1955.** 7 figs., 5 tables, German summary p. 208–209. **DWB**—A quite substantial study of ground water conditions in the Szigetköz. Water level observations and pumping experiments were made, studying the strong influence of the Danube River. Weather conditions have only a small effect. *Subject Headings:* **1. Ground water studies 2. Szigetköz Hungary.**—*A.A.*

10M–721 551.579.5(794)

Isherwood, J. D. and Pillsbury, A. F. (*both, Dept. of Eng., Univ. of Calif.*), **Shallow ground water and tile drainage in the Oxnard Plain.** *American Geophysical Union, Transactions*, 39(6):1101–1110, Dec. **1958.** 9 figs., 3 tables, 12 refs. Discussion by D. A. van de Leur, Max Bookman and R. G. Thomas in *Journal of Geophysical Research*, Wash., D. C., 64(7):855–860, July **1959.** fig., table, 5 refs. **DWB, DLC**—A study of the hydrology of the shallow ground waters of the Oxnard Plain, Ventura County, California, was made using a network of piezometers at 10 and 20 ft below the surface. Mean depth to water is 6.8 ft and shows little difference between Jan. and June readings during the years 1953–1956. The perched water table slopes to the south and southwest. It is only slightly above sea level near the coast. Piezometric head differences established the presence of a downward gradient over most of the area. The shape and rate of recession of the water table in tile-drained land and tile effluent rate were measured at various sites. Twenty-two percent of water applied is discharged from tile lines as waste. Equipment and technique for hydraulic conductivity measurement in unstable soils is described. *Subject Headings:* **1. Ground water hydrology 2. Drainage 3. Oxnard Plain, Calif. I. Van de Leur D. A. II. Bookman Max III. Thomas R. G.**—*Authors' abstract.*

10M–722 551.579.5

Kajetanowicz, Zbigniew, **Observations hydrologiques dans un système homogène.** [Hydrological observations in a homogeneous system.] *Acta Geophysics Polonica*, Warsaw, 3(3):110–114, **1955.** fig., eq. Polish summary p. 114. **DLC**—Numerical values of surface and ground water levels are not easily comparable and therefore useless without having sufficient data from the water gaging stations. It is necessary to develop some kind of uniform basis for comparison, or even a uniform scheme in which every numerical determination of the water level would indicate the degree of intensity of the phenomenon. Such a scheme is described here. It utilizes the normal range of water level variations included between the mean low level of water, which is the numerical mean of yearly minima (for many years) and the mean high water level, computed similarly for maxima (for many years). *Subject Headings:* **1. Ground water levels 2. Surface water levels 3. Water level variations.**—*A.M.P.*

10M–723 551.579.5(793)

*Maxey, George B. and Jameson, C. H., **Progress report on the ground-water resources of the Las Vegas Artesian Basin, Nevada.** Prepared by the Geological Survey, U. S. Dept. of the Interior

in cooperation with the Nevada State Engineer's Office, March **1945.** 36 p. 5 tables, 10 figs. (some fold.), 11 refs. **DWB**—Artesian wells provide the chief source of water for the Las Vegas Basin. The increased number of wells during 1924–1944 and increased use of water in each well, has lowered the water table seriously. A study of some 430 wells in the area is reported in detail, and the precipitation data obtained in this study in the recharge area (from Las Vegas and Kyle Canyon Station) are tabulated and plotted on charts and discussed briefly on p. 30–31 in connection with the possible recharge effect. There is a lag of about 1 year in the recharge or decrease effect of more or less than normal precipitation. *Subject Headings:* **1. Ground water depletion 2. Ground water recharge 3. Las Vegas Basin, Nevada.**—*M.R.*

10M–724 551.579.5:551.506(43)

*Peisl, Friedrich, **50 Jahre Grundwasserbeobachtungen am Brunnen in Eglfing.** [Fifty years' ground water observations at the Eglfing Spring.] *Deutsches Gewasserkundliches Jahrbuch, Besondere Mitteilungen*, No. 9, **1953.** 36 p. 29 figs., refs. At head of t-p: Herausgegeben von der Bayer. Landesstelle für Gewässerkunde in München. **DWB**—Current data for precipitation, runoff, ground water level and evaporation from a lysimeter are given in graphical form. An attempt is made to compute ground water fluctuations from the water balance equation. *Subject Headings:* **1. Hydrologic cycle 2. Ground water fluctuations 3. Lysimeter observations 4. Munich, Germany.**—*A.A.*

10M–725 551.579.5(71)

Pollitt, Keith, **Status of ground-water studies in Canada.** *Royal Society of Canada, Transactions*, Ser. 3, 51(4):87–92, June **1957.** fig. **DLC**—Ground-water studies in Canada were initiated by the Geological Survey of Canada in 1903. Investigations during the first thirty years were confined almost solely to the provinces of Manitoba, Saskatchewan, and Alberta. More recent surveys have embraced nearly every province in Canada. The provinces of Alberta, British Columbia, Ontario, and Quebec carry on ground-water studies which are independent of federal programs. Ontario was the first to enter the field in 1945. Ground-water studies are a necessity for a full understanding of the hydrology of Canada and so are essential in the planning of settlement and industry in our country. *Subject Headings:* **1. Ground water research 2. Hydrology 3. Canada.** —*Author's abstract.*

10M–726 551.579.5(73)

Sayre, Albert Nelson, (*Ground Water Branch, U. S. Geological Survey*), **Ground water comes of age in the United States.** *Royal Society of Canada, Transactions*, Ser. 3, 51(4):47–52, June **1957. DLC**—The investigation of ground water as performed by the U. S. Geological Survey, largely in cooperation with State agencies, includes three phases. In different investigations these are mixed in infinite variation, according to the needs of the investigation and to the personnel available. The first phase and the one that consumes the largest part of our energies includes the areal investigations. These are the systematic studies designed to locate and appraise the ground-water supplies of the nation, area by area, to determine the quantity and chemical quality of the water and its replenishment, movement, and discharge through springs or wells. The second phase is research into the physical laws governing the occurrence and movement of ground water in relation to such subjects as replenishment of the aquifers by natural or artificial means, causes of land subsidence,n ature of intrusion of salty water into fresh water aquifers, and conservation and development of ground-water resources. The third phase is the maintenance of a current record of the status of the ground-water resources by measuring water levels and artesian pressures in wells. The Survey is authorized also to locate and appraise water supplies for other Federal agencies, but it does not do so for private individuals, industries, or municipalities, although it is authorized to cooperate with municipalities in investigations in which the municipalities' interest is in water for public supply; nevertheless the Survey's interest is in the availability of water for any and all uses. Some of the State organizations are authorized to make specific studies to meet private and municipal needs. A growing body of trained consultants also is available for this purpose. The paper discusses the methods and organization by which these activities are carried out, and the development of this programme during the history of the U. S. Geological Survey. *Subject Headings:* **1. Ground water research 2. Water resources 3. United States.**—*Author's abstract.*

10M–727 551.579.5:631.67

†Schiff, Leonard (*Agricultural Res. Service, Bakersfield, Calif.*), **Status of water spreading for ground-water replenishment.** *American Geophysical Union, Transactions*, 36(6):1009–1020, Dec. **1955.** table, 32 refs., 5 eqs. **DWB, DLC**—Methods of spreading water on land surfaces and by injection are reviewed and some results given. Some localities utilizing or contemplating the use of water spreading to replenish ground-water supplies are mentioned. Included are: 1) develop-

ents in vegetative, chemical and mechanical treatments to increase infiltration rate; 2) shaft, ench, and pit injection methods which cut through less pervious soil and inject water into aquifers; d 3) operational procedures such as cultural methods, length of wetting and drying periods, and rface heat. Soil-water movements are described and interpreted in the light of the Darcy equation. mitations in the use of treatments based on the surface soil and stratigraphy are described. Solu- ons to some problems and research directed toward existing needs are mentioned. A strip system id rotational system of spreading water based on an infiltration rate-percolation rate ratio are scribed. The strip system uses portions of an area and it is conceived that as much water may filtrate as using the entire area. Surface soil treatment to increase this ratio may result in addi- onal benefits. Land between flooded portions might be farmed or used for other purposes. This stem visualizes a 'subsurface lake.' In the rotation system some portions will be flooded while filtration rates remain high and other portions will be drying for recovery in infiltration rate. ools to determine the suitability and characteristics of a proposed spreading area, such as soil rveys, laboratory tests of water and soil, well logs, jetting, cable tool test holes and infiltrometers e discussed. Examples are given of water spreading grounds constructed on sites selected by ne use of these tools. *Subject Headings:* **1. Irrigation 2. Ground water recharge.**—*Author's* stract.

10M–728 551.579.5(73)

Thomas, Harold E. (*U. S. Geological Survey*), **Ground-water regions of the United States—heir storage facilities.** (In: U. S. Congress. House. Committee on Interior and Insular Affairs, hysical and Economic Foundation of Natural Resources 3:3–78, **1952.** 48 figs., tables, refs. p. 78.) WB—The United States are divided into ten ground-water regions, which are described in some etail, touching also the relation to climatic conditions (snowshed limits, mountain effects, floods, rid regions, evapotranspiration, etc.). *Subject Headings:* **1. Ground water storage 2. United tates.**—*A.A.*

10M–729 551.579.5:551.579.4(794)

Troxel, Harold C. (*U. S. Geological Survey, Los Angeles, Calif.*), **The influence of ground-water torage on the runoff in the San Bernardino and eastern San Gabriel Mountains of Southern Cali- rnia.** *American Geophysical Union, Transactions,* 34(4):552–562, Aug. **1953.** 5 figs., 6 tables, refs. **DLC**—Plotting the discharge (Q) hydrograph of 13 mountain creeks in California for several ears the author analyzes the depletion and recharge of perennial ground water storage, which is argely dependent on the snow accumulation in the mountains. The monthly recession constant K n the formula $Q = Q_0 K^t$ is fairly constant for all analyzed creeks (.94—.97). In a similar way the easonal and storm runoff depletion is analyzed. *Subject Headings:* **1. River discharges 2. Ground ater storage 3. Mountain hydrology 4. California.**—*A.A.*

10M–730 551.579.5(439.1)

Ubell, Károly, **A talajvízjárás törvényszerüségei.** [Laws of ground-water variation.] *Hun- ary. Vízgazdálkodási Tudományos Kutató Intézet, Beszámolo . . . évi Munkásságáról,* 1954:108–22, pub. **1955.** 4 figs., tables, 3 refs., eqs. German summary, p. 208. **DWB**—Variation of ground vater with temperature is studied and expressed as elliptical and sinusoidal relations. The delay n phase depends upon the depth. Data are given for 47 stations. Ground water variations due to ercolated precipitation water can occur only up to a depth of 7–10 in, depending upon soil properties. *Subject Headings:* **1. Ground water variations 2. Hungary.**—*A.A.*

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